APR 5 1911

JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

Entered as second-class matter May 7, 1906, at the Post Office at San Francisco Cal., under the Act of Congress March 3, 1879

VOL. XXVI NO. 13 | SAN FRANCISCO, APRIL 1, 1911 | PER COPY, 25 CENTS

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POWER AND GAS
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VOLUME XXVI | SAN FRANCISCO, APRIL 1, 1911 | NUMBER 13

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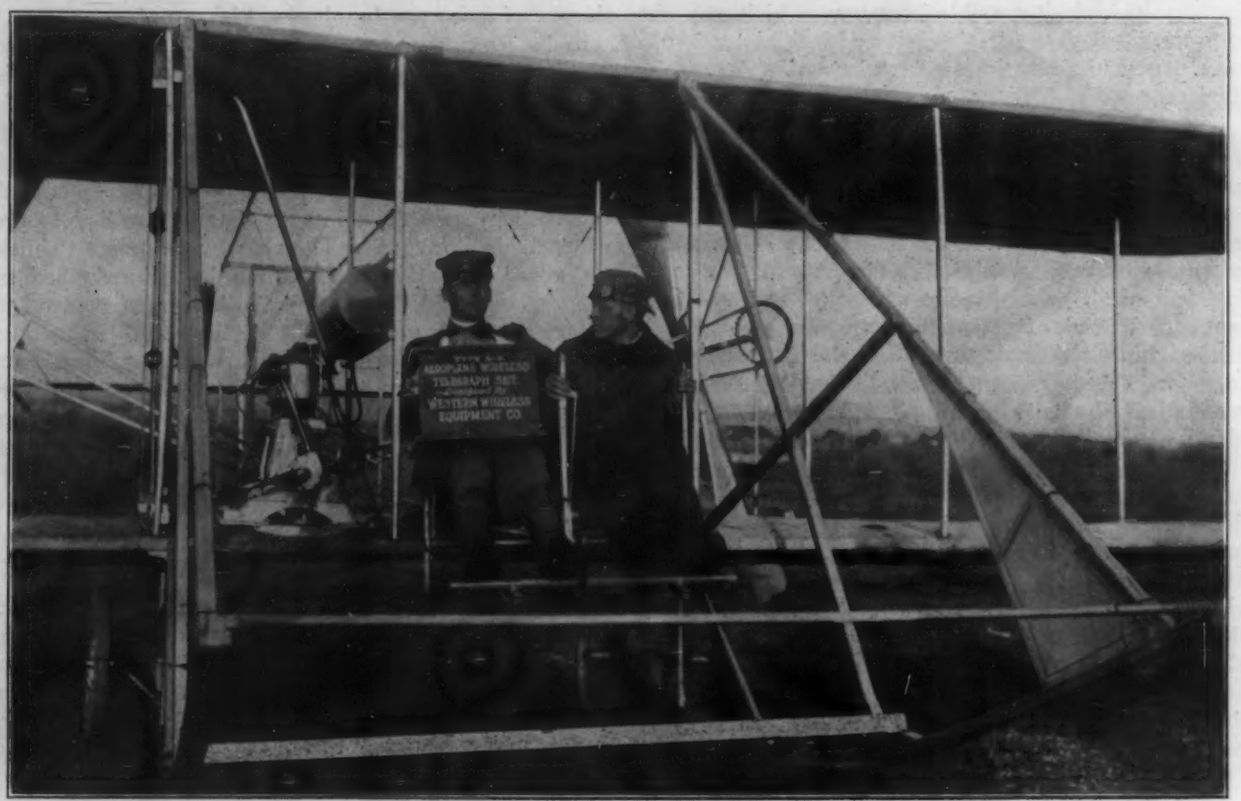
WIRELESS TELEGRAPHY FROM AN AEROPLANE

BY E. E. ENNIS.

Wireless telegraphy as a factor in the aerial evolutions of the future in naval and military warfare was thoroughly exploited in a series of experiments conducted for the War Department at the recent aviation meet at San Francisco. At that time it was conclusively proven for the first time that communication can be established between an aeroplane, hundreds of feet in the air, and a ground station, and that messages can be transmitted with absolute accuracy from almost any distance or altitude with practically no interferences from other wireless stations in the vicinity.



Wright Aeroplane Equipped for Wireless Tests.

From a military standpoint, the results obtained are invaluable. The chief function of the aeroplane in warfare is along the line of scouting duty, and finds its most important place in reporting the position of hostile bodies of troops, making maps of fortifications, locating guns, supply trains, etc. The facility with which such information can be "wirelessed" to headquarters from an aeroplane circling thousands of feet overhead and practically out of range of hostile gun fire, and the value of such information in governing the arrangement and advance of troops, artillery and fortification construction, makes the wireless the most valuable contribution of the century to the highly advanced science of modern warfare.

The tests were conducted at Selfridge Field and were under the direct charge of Lieutenant Paul W. Beck and representatives of the Western Wireless

Equipment Company, who designed and built the apparatus for the experiments. The maximum distance covered was 40 miles and the greatest altitude attained during the tests was 500 feet, at which time Lieutenant Beck, carried as a passenger in a Wright machine, transmitted two complete messages in the Morse code to the wireless station on the aviation field while traveling at an approximate speed of 55 miles per hour. Both messages were received at the field station as well as by other stations, one of which was over 40 miles distant, with absolute clearness and accuracy.

The apparatus used in the experiments was a radical departure from the generally accepted design and embodied many unique ideas in construction and operation. The entire sending instrument, which Lieutenant Beck carried in his lap, weighed but 29 pounds and was enclosed in a small mahogany case with sending key fastened on the top. In constructing the apparatus, cognizance was taken of certain physiological phenomena originally discovered by Professor Fessenden, i.e., when a spark is used which gives a high-pitched musical note, the ear becomes more acutely sensitive to its presence and it can be distinguished at much greater distances than sparks of a lower frequency. The transmitting end was therefore tuned to the highest possible frequency, which gave the set a certain degree of selectivity and eliminated to a great extent the disturbing impulses of extraneous interferences.

The integral instruments consisted in the main of a small storage cell, a high-frequency coil-transformer, an inductive transformer for syntonizing, variable condensers for varying the capacity of the oscillation circuit, a noiseless discharge chamber for the spark and an ordinary telegraph key. The antenna consisted of 95 feet of phosphor-bronze wire, 1/16 of an inch in diameter, formed of seven fine strands inter-twisted and weighing 1½ ounces. When the aeroplane left the ground this was wound around a small drum which unwound at the will of the operator and swung out behind, clear of the propeller. The wire was fastened to the machine by a simple clip attachment, that was easily opened when the aeroplane neared the ground, releasing the antenna and allowing it to drop to the ground, and permitting the machine to land free from possibility of entanglement with tree tops or other objects. The transmitting instruments were properly balanced with the antenna both as to capacity and inductance, before the aeroplane left the ground.

For a ground connection a capacity ground was substituted in the form of the wire stays of the aeroplane. This was found to have ample capacity to act as a counterpoise to the antenna. The strange feature of the demonstration was that at all times the ground was actually higher than the antenna, which is the direct reverse of all other wireless work, where a certain height of the antenna above that of the ground is desired, and which under ordinary conditions is almost imperative. Another point that was noticed was that the higher the aeroplane went the clearer the signals became, which seems to bear out Tesla's theories that stationary waves exist in the earth, the disturbance of which by even minute currents produces extended effects, and that at the altitude of a mile or more above the actual surface of the earth, the globe could be practically belted by wireless waves with comparatively little power.

The steady decrease in the loudness of the signals as the aeroplane traveled away from the field station and the correspondingly steady increase as it returned indicates that with a receiving instrument on the ground properly calibrated and used in conjunction with a sensitive galvanometer and a Wheatstone bridge, it would be quite possible to determine the approximate distance of an aeroplane from a ground station. This would be specially valuable in locating hostile machines communicating with their own troops, especially if used in connection with a directive system like the Belli-Tosini, which is able by the use of an instrument called a radio-goniometer to determine the compass direction of a station in operation.

Merely tentative efforts were made to receive a message aboard an aeroplane during the tests at Selfridge Field, owing to the practical impossibility of hearing any of the signals through the terrific exhaust of the engine. The aeroplane is in its crude state yet, and until the noise is eliminated it is impossible to receive signals from the ground and have them audible in telephone receivers even though as sensitive a detector as the perikon is used. Until such time as a degree of quiet can be obtained in aeroplane motors it will be necessary to use some form of mechanical receiver of the tape or galvanometer type, tuned to the same group frequency as the radiating circuits of the sending station. This could probably be developed to a successful point with the proper experimentation.

Wireless work as applied to aeroplanes is capable of much greater development than as applied to any other field of research. The ability to obtain an almost unlimited wave length, and absolute freedom from interference, added to the small amount of power necessary to reach unbelievable distances, all open up a vista to aeroplane wireless that is as free from limits as the medium through which it works, and will undoubtedly lead to the clearing up of many of the contradictions that hamper the progress of the experts

PHANTOM TELEPHONE CIRCUITS.

BY W. R. PATTON.

Probably one of the most valuable developments of the telephone art as applied to long distance service is the system of providing a third circuit known as the phantom circuit, from two existing metallic circuits, without stringing additional line wire. Extravagant claims are sometimes heard, both for and against the practical efficiency of this class of circuit, and it is possible that a number of employes do not understand its true characteristics.

The so-called phantom circuit is a real, metallic circuit in which each of its two conductors is formed by the two wires of a physical circuit connected in parallel. It requires definite line construction in pairing and transposing the physical circuits, and the two wires of the side circuit must be considered both as to their fitness for service in the single metallic circuit and for service as one side of the phantom circuit. The effect of poor line conditions is much more serious upon a phantom circuit than upon a side circuit, on

account of the double leakage of the four wires and the greater chance for unbalanced insulation. Also, the effect of line trouble is much more serious in this double use of the line wires. However, any improvement in line conditions or maintenance efficiency necessary to make the phantom circuit reliable, would probably not increase the maintenance cost per talking circuit because of the increased number of circuits.

Any noise experienced on phantom circuits is subject to practically the same kind of treatment as that employed for noises on the side circuits. A wire chief's careful test of the phantom circuit will discover any defects or unbalanced conditions, and the remedy. Probably the most frequent cause of noisy phantoms, and the most difficult to handle, is inductive disturbance from paralleling lines of the various power companies. This disturbance is often serious on the phantom circuits when it is scarcely noticeable on the side circuits. In some cases it can only be eliminated by increasing the distance between the telephone lines and the power lines, but obviously this most expensive remedy should not be applied until after all other means have been exhausted. Unbalanced conditions either in the power company's circuit or in the two side circuits of the phantom are usually easily discovered and remedied. The effect of the induction may be sufficiently reduced by this means, or possibly by a rearrangement of the circuit layout. In one case a phantom circuit about 100 miles in length was cut in two, making one of seventy miles and one of thirty miles. This confined the disturbance to the thirty-mile section, and its effect upon this short phantom was found to be very slight and the phantom was put into regular service. The seventy-mile phantom was connected to the physical circuit which was released by the installation of the thirty-mile phantom, thus completing the original 100-mile circuit and avoiding the inductive disturbance.

In emergencies it is sometimes possible to provide a temporary phantom circuit under conditions which theoretically would appear prohibitive. When an additional circuit is needed on short notice, it is usually advisable to make practical experiments to ascertain whether a phantom can be obtained. Often a slightly noisy circuit which could only be used by operators for passing calls would be of benefit. Such a circuit can be provided very quickly in certain cases, by using the telegraph leg of a simplex circuit as a grounded phantom circuit.

With the type of loading coil heretofore employed, it has not been possible to operate the phantom system over loaded circuits. To overcome this limitation, the American Telephone & Telegraph Company's engineers have recently invented a new type of loading coil which permits not only of the operation of the phantom system over the loaded circuits, but also of applying the loading coil system to the phantom circuit. Thus by a combination of the phantom system and the loading coil system, a circuit can be provided at very low cost which will furnish a range of transmission greater than that of the loaded physical circuits. Both of these systems are now applicable to the largest circuits in commercial use (No. 8 copper, 435 pound) and the range of commercial transmission will therefore be appreciably extended.—Pacific Telephone Magazine.

RADIANT ENERGY AND MATTER.[1]

BY SIR J. J. THOMSON.

To every inhabitant of the solar system, whether resident on the earth or on Mars, the subject of radiant energy is one of vital importance. The planets are not living on their own resources. They are dependent for their energy from day to day, almost from minute to minute on the supplies they receive from the sun. The solar system is really a power distribution scheme on an enormous scale, and the sun is the power station. The method by which the power is transmitted is practically wireless telegraphy, because there is every reason to believe that radiant energy travels from the sun in the form of something mechanically equivalent to electric waves. Practically all the power used for the purposes of the world's work has come from the sun.

The magnitude of the energy sent out from the sun is larger than many people realize. Measurements have shown that on a clear sunny day the sun transmits to the earth energy which corresponds to about 7000 h.p. per acre. At present all that is practically wasted, or rather it is spent in making the earth a little warmer, generally in localities where any addition to the temperature could well be dispensed with. Attempts have from time to time been made to utilize this enormous supply of energy, but not with any great measure of success.

At the last meeting of the British Association an account was given of an experiment in this direction, which was being made in one of the hot districts in the United States, to transform the heat of the sun into work by means of low-pressure turbines. That experiment has shown that it is possible to obtain from the sun energy at less than half the cost of the cheapest power hitherto available. There is no doubt that in the sun there is a supply of energy to fall back upon when coal gets dear and water-power is all used up. Only about three-fifths of the energy sent to the earth from the sun is appreciable to the eye as light. If the sun were twice as hot as it is, four-fifths would be appreciable in that way, and if it was still hotter the whole of the energy would affect the eye as light. Radiant energy is not heat; that is, the energy of the sun does not reach the earth in the form of heat. It is not heat at all until it falls on bodies whose temperature can be raised. It might rather be called electricity; in fact, I believe it is a form of electricity, for all the methods used to detect and measure radiant energy depend upon absorbing it and transforming it into heat.

Professor Boys has produced an instrument for measuring the heat radiated from various bodies, which is so sensitive that he can detect the radiation of heat from a candle at the distance of a mile.

Applying to the sun the law that the energy radiated from any physical body is proportional to the fourth power of the absolute temperature, we find that the heat of the sun is about 6000 degrees. At that temperature the amount of energy radiated is something like 15,000 h.p. for every square centimetre of the sun's surface, an appalling amount in the aggregate when the area of the sun's surface is taken into account.

[1]Abstract of a paper read at the Royal Institution, March 4, 1911.

OIL BURNING.

BY E. N. PERCY.

The world's fuel production in 1909 was 1,084,000,000 tons of coal and 40,000,000 tons of petroleum, the calorific equivalent of the petroleum being 60,000,000 tons of coal. In other words, exclusive of wood, it consisted of 108 parts of coal and 6 parts of petroleum in calorific equivalent value. Of this the United States produced 444,000,000 tons of coal and 24,000,000 tons of petroleum, the calorific equivalent of the petroleum being 36,000,000 tons of coal. California produced practically no coal. The average value of the coal in the United States was $1.31, the average value on the Pacific Coast was $4 and for California $6. In 1910 California produced 13,000,000 tons of petroleum, the calorific equivalent being 19,500,000 tons of coal. Practically all of this oil has been sold and the rate of increase in consumption is greater than the average rate of increase in production, the latter being erratic because of the development and subsequent decline of gushers.

At the present time petroleum is being developed in almost all parts of the earth and the general conclusion is that oil fuel is a permanent and growing factor in mechanical engineering. It is hard to approach the subject of oil burning without considering it in the broadest sense to include all departments from gasoline carbureters to the Russian Astatki burners.

At the writing of this article there lies before the writer a pile of patent records five inches high. They include all patents issued in the United States for oil burners. The individual inventor usually repeats the history of oil burners in the process of his education by experience. The first efforts and ideas are usually along the line of vaporizing burner, i.e., a burner which is heated by its own flame or otherwise, with a view to vaporizing or gasifying the oil, a system that has long since been discarded for two reasons, one chemical, the other practical: First—Any fixed gas contains a less percentage of carbon than liquid hydrocarbons, further in gas formation it is necessary that free carbon be deposited. Second—This free carbon clogs the burner to an objectionable degree.

The next step is usually along the lines of atomization, and the inventor goes into the construction of immensely complicated apparatus to accomplish it. This work is frequently characterized by an amazing ignorance of the fundamental properties of oil, also of the wide difference between various kinds of oil. We will give here a chemical definition of the principal oil classifications, the details of which may be easily found in any text book on chemistry.

Paraffine oils may be classified, first as those containing $C_nH_{2n} + 2$ up to $C_{28}H_{58}$ (Pennsylvania, West Virginia, Kentucky, Kansas, Colorado, etc.), and second, those containing $C_nH_{2n} + 2$ up to C_nH_{34} and above that C_nH_{2n-2} (polymethylenes, Ohio and Canada).

Cyclic oils contain, first, stable polymethylenes consisting largely of napthenes C_nH_{2n} (Russia), and second, less stable polymethylenes with unsettled hydrocarbons with nitrogen and sulphur compounds leaving an asphaltic residue on distillation (California).

Asphalt is a compound of cyclic hydrocarbons which are attacked by sulphuric acid. Paraffine is not readily attacked by sulphuric acid.

It is difficult to obtain unbiased data from recognized authorities on oil burning because each authority, as a rule, has some private system or apparatus to exploit.

The vaporizing system of burning oil has been quite generally abandoned, not only in oil burners, but in gas making apparatus and gasoline engine carbureters, for the same reason in each case, that the oil is not completely burned, an objectionable residue being left. The easiest oils to burn, mechanically speaking, are the thinnest, as they are more easily atomized. Oil in bulk has a cohesiveness which resists any atomizing action. Furthermore, as the oil is broken up into large drops, each drop develops a surface tension which is much greater even than cohesiveness. Surface tension is a force seldom considered by those who have studied the subject of atomization.

The writer has seen drops of water floating in oil which was boiling at a temperature of 300 degrees Fahrenheit. As the corresponding pressure of steam at this temperature is 100 pounds and as it is obvious that nothing but surface tension would have held these drops intact, the work necessary to overcome this tension can be appreciated. It is the writer's firm belief that any system of atomization should proceed as nearly as possible from the bulk condition to the ultimate atomization without allowing the formation of intermediate spherical drops and their attendant surface tension which has to be broken up. He is also inclined to believe that this explains the reason for the superior economy of burners having a single stage of atomization as compared to multistage types.

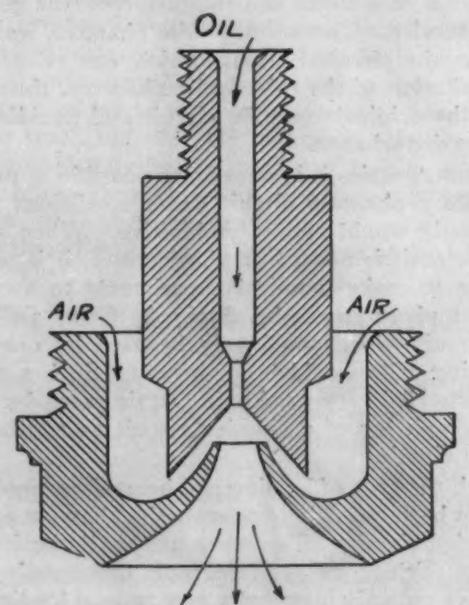


Fig. 1.

During the development of the Priestman oil engine many types of atomizers were tried and the one finally adopted was that shown in Fig. 1. This is clearly a single stage atomizer and has been found most satisfactory, although, to the writer's knowledge, the principle of a jet of air impinging directly opposite the stream of oil has never been utilized in oil burning.

Various principles are used to effect atomization, including mechanical methods, centrifugal force and

direct battering by means of steam or air, the last being in most general use.

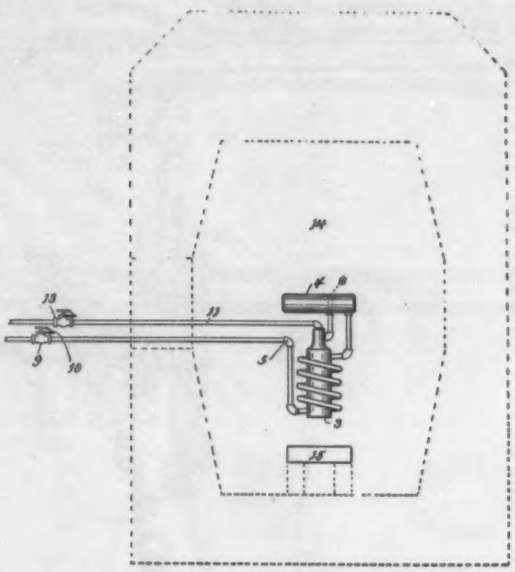


Fig. 2.

Referring again to the earlier types of burners and furnace arrangement we have in Fig. 2 a burner designed to go inside the furnace and vaporize the oil to a gas before burning; it has never come into general

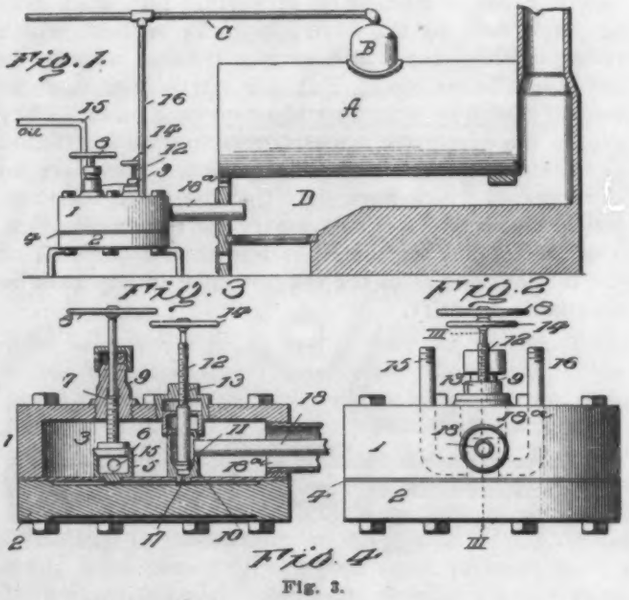


Fig. 3.

use. Fig. 3, of inconvenient size and complication, has never come into general use. Fig. 4 shows another of which the same might be said. These are given simply as illustrations of the impracticable form of some of the early types of oil burners.

Probably the earliest and most complete experiments in the oil-burning line were made in Russia in the attempt to apply the Russian Astatki to power and industrial purposes. Fig. 5 shows one of the earliest and simplest burners used for that purpose and said

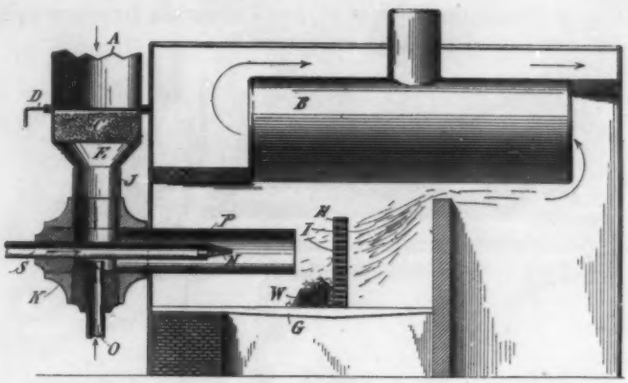


Fig. 4.

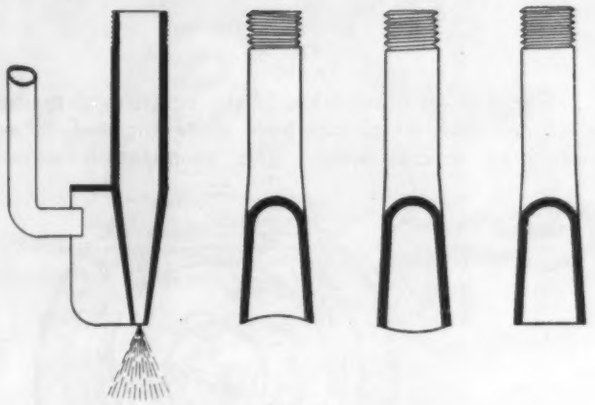


Fig. 5.

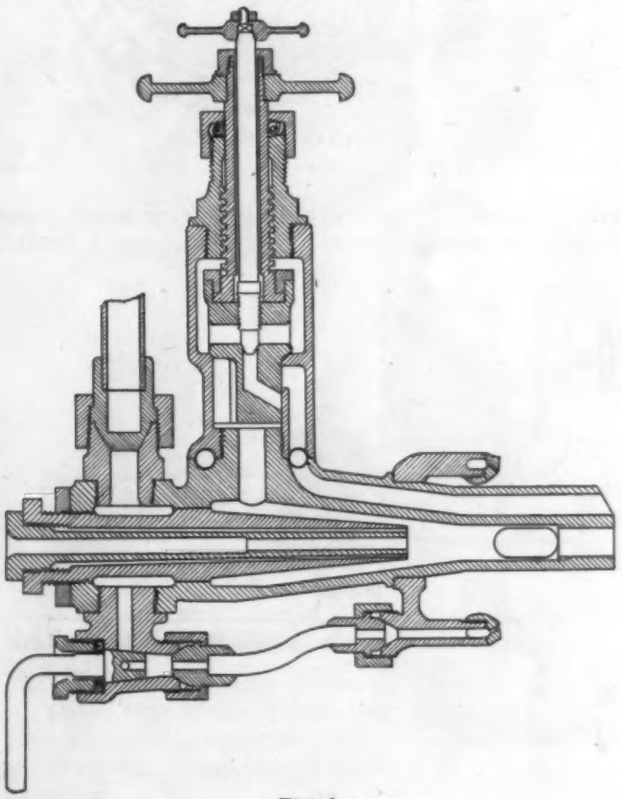


Fig. 6.

to be highly successful. Fig. 6 is an excellent illustration of the Holden burner, which was applied for many years, with great success, to locomotive work.

Fig. 7 shows one of our earlier California burners and has been used to quite an extent.

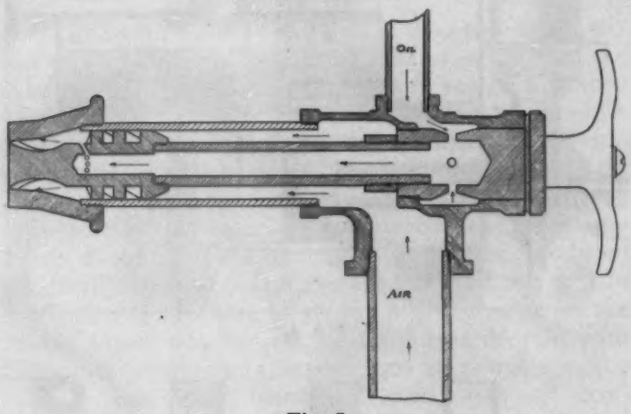


Fig. 7.

Fig. 8 is an illustration of the centrifugal method of atomization which has been quite successfully exploited by several firms. The atomization usually

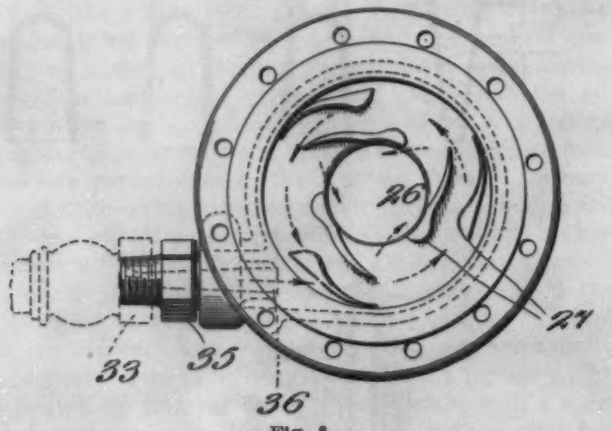


Fig. 8.

takes place in the central chamber, from which pipes lead to the various burners. Fig. 9 illustrates a method

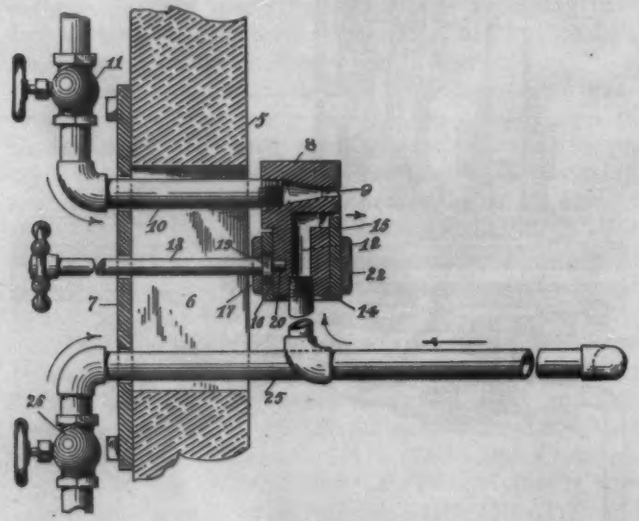


Fig. 9.

of superheating the steam, a method which is used by many engineers, a patent for which has evidently been granted to someone.

Fig. 10 shows a siphon burner which has been more or less developed by several inventors, the object of which is to comply in the first place with the Underwriters' disapproval of gravity oil systems and in the second place to eliminate the oil pump.

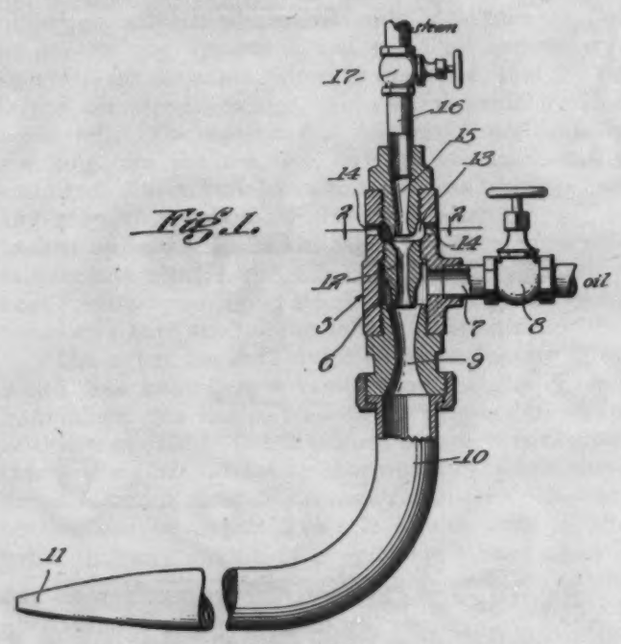


Fig. 10.

As said before, a certain amount of work is necessary in order to atomize oil properly. This work may be partly done by the mere application of heat, which reduces cohesiveness and surface tension, namely, in reducing the viscosity. But this viscosity consists of two factors in no wise dependent on each other. They are, in the first place, cohesiveness, and in the second place, surface tension or adhesiveness. There are no experiments which have supplied data as to the theoretical amount of work necessary for the atomization. The indications are that it is less than 1 per cent of the thermal power in the oil, but must in any case be a variable quantity.

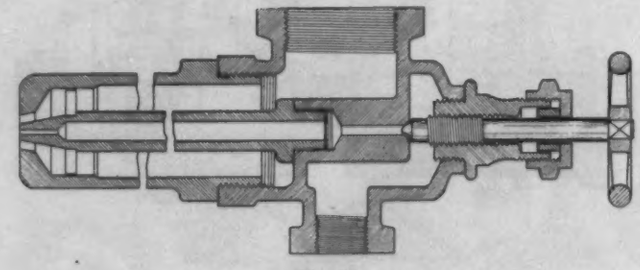


Fig. 11.

Fig. 11 shows an ordinary round flame outside mix burner, in which the oil going into the smaller pipe passes through the central pipe and the air entering the larger passes around the orifice. The oil is regulated with a hand wheel. This particular burner is designed for low pressure and is of 2, 4, 8 lb. pressure. Such a burner is trimmed first by increasing or decreasing the diameter of the inside pipes to suit the air pressure, second by increasing or decreasing the oil

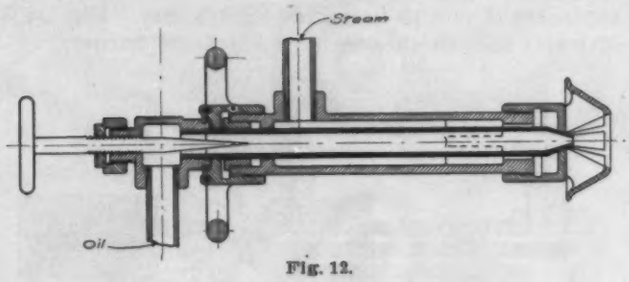


Fig. 12.

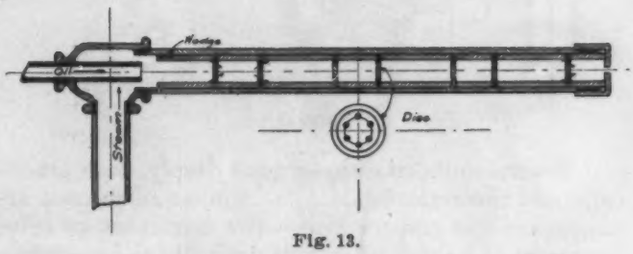


Fig. 13.

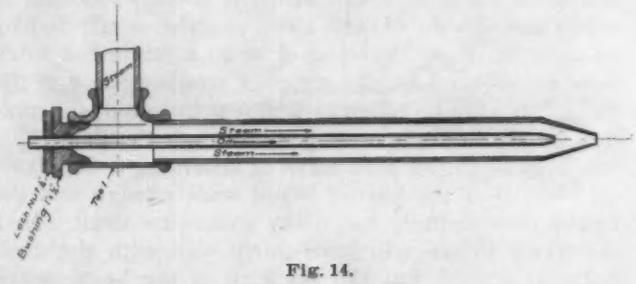


Fig. 14.

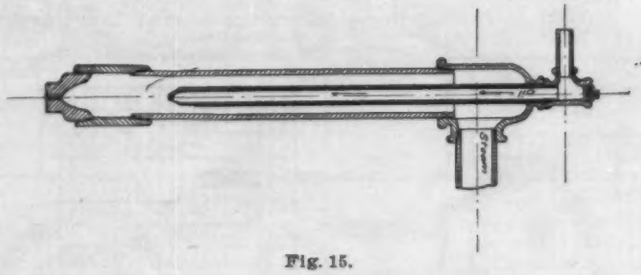


Fig. 15.

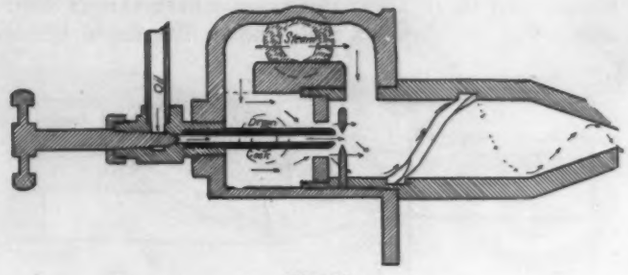


Fig. 16.

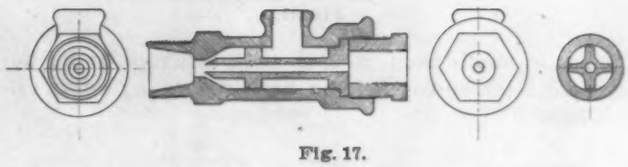


Fig. 17.

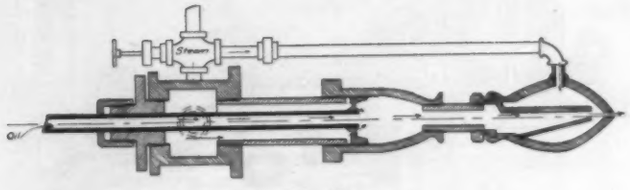


Fig. 18.

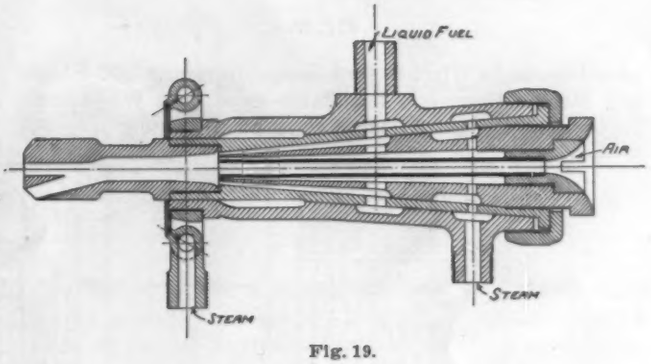


Fig. 19.

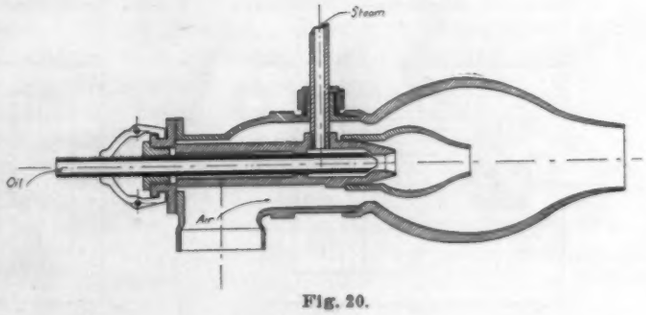


Fig. 20.

hole to suit the oil pressure, third by extending the inside pipes outwards to increase the length of the flame or inwards to decrease the length of the flame and widen it.

Fig. 12 shows a burner of the same type but equipped with a hand wheel whereby the inside pipes may be moved and the length of the flame controlled at will. Fig. 13 shows a similar type of inside mix burner made from pieces of pipe and iron washers; such a burner will atomize splendidly, making a broad flame close to the burner, but will soon clog and has no possible means of cleansing except complete taking down. Therefore such a burner makes a flame so broad and close that it burns off the corners of the square head.

Fig. 14 shows a pipe burner of popular type that always gives fair satisfaction if carefully made. Fig. 15 shows another type of pipe burner. Fig. 16 is an inside mix with special curve giving a rotary flame; it is intended primarily for Scotch boilers. Fig. 17 is another type of round flame burner made to fit into a gas shell, iron smelting furnace or other iron shell. Fig. 18 is a multistage burner often used. Fig. 19 is another type of the Holden burner; its best use is to illustrate the complications that are sometimes introduced to accomplish results equalled by much simpler apparatus.

Fig. 20 is a round flame of the combined type using both steam and air from a blower. The idea of this type of burner is that the amount of air necessary for the combustion issues from the burner with the oil. The result is an intense combustion close to the

burner and there are many cases where this is desirable. Fig. 21 shows a well known flat flame burner

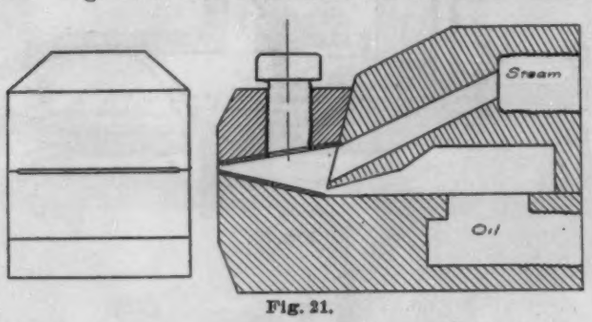


Fig. 21.

which is much used in back-shot furnaces to be described later and is held in high regard by some engineers.

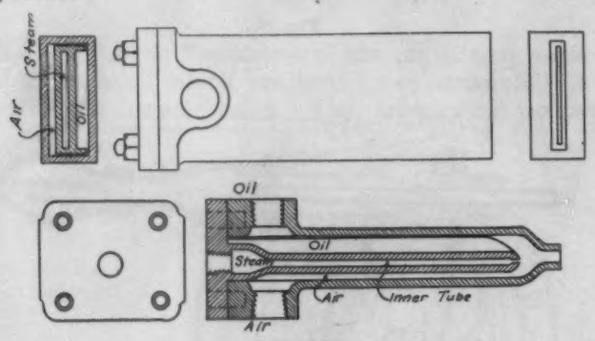


Fig. 22.

Fig. 22 is what is popularly known as the Southern Pacific burner, a flat flame type, and while lacking some points of refinement in the eyes of many engineers is said to be highly satisfactory. Fig. 23 illustrates still another form of flat flame burner.

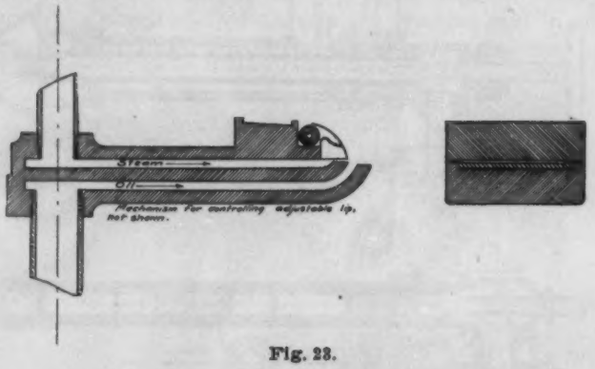


Fig. 23.

Several authorities have gone deeply, both practically and theoretically, into the subject of furnace arrangement and construction. The concensus of opinion seems to be that while it is desirable to have white hot brick all around the flame, it is impracticable in many cases to do so, and a compromise is effected by using a flat flame, burning close to a white hot brick floor through which the air rises steadily through the flame. It may be taken as a first principle of oil combustion that the air must pass through the flame.

Fig. 24 shows nine ways of trimming a flat flame oil fire. In 1 the burner is not wide enough and the bricks have entirely too many spaces for draft. In 2 the flame shown will burn fairly well with the draft holes as shown, but the capacity of the burners can never be completely realized until the draft holes are made longer and the shell in the burner lengthened.

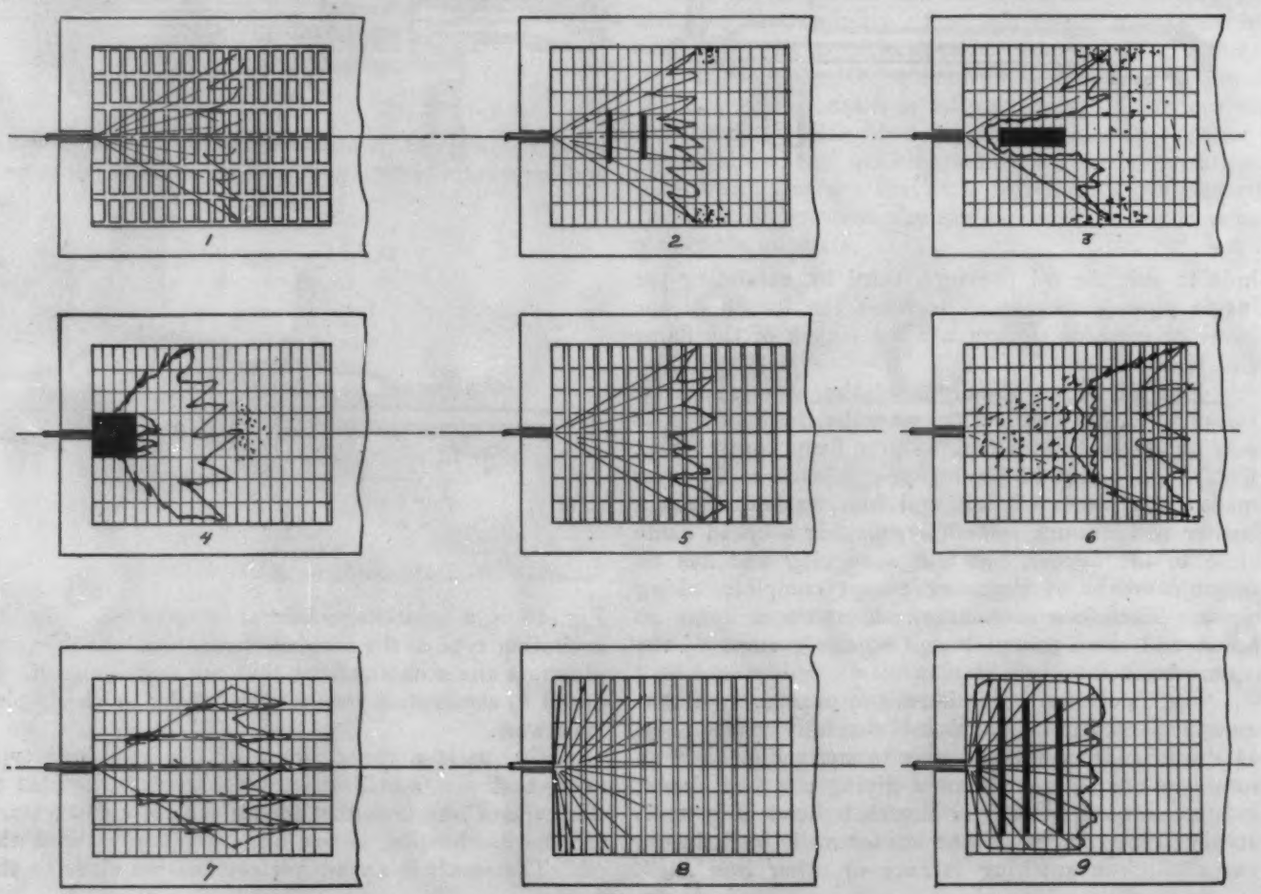


Fig. 24.

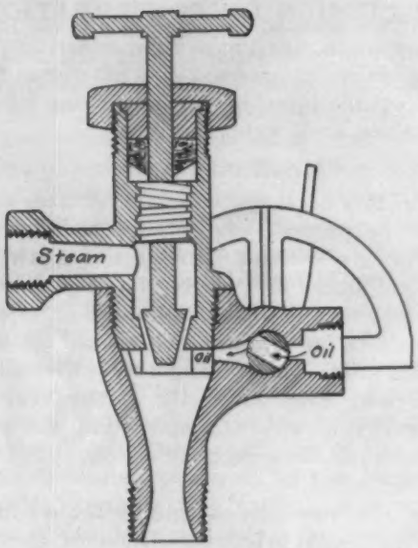


Fig. 25.

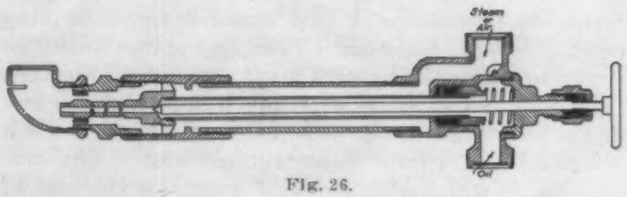


Fig. 26.

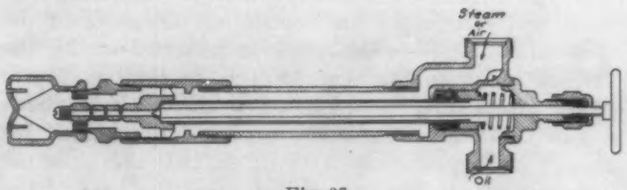


Fig. 27.

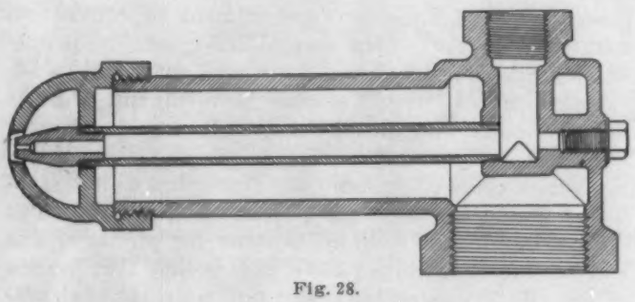


Fig. 28.

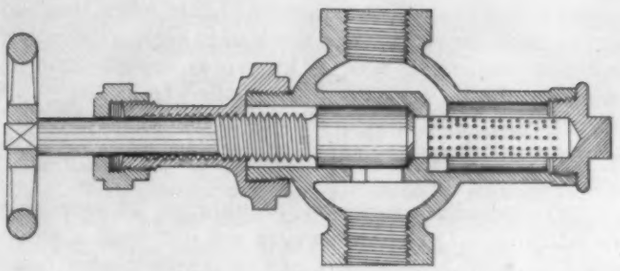


Fig. 29.

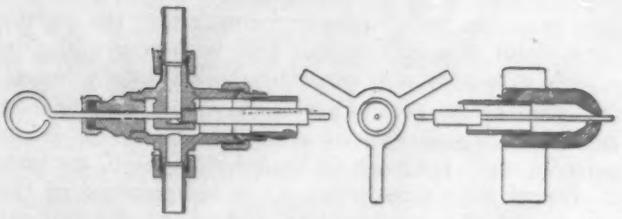


Fig. 30.

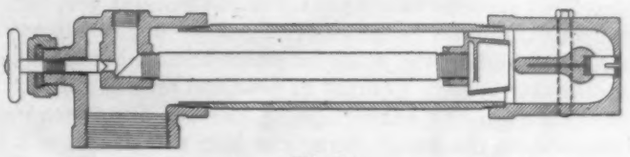


Fig. 31.

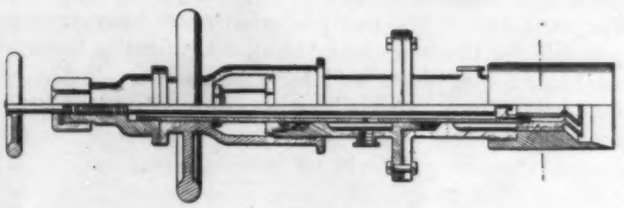


Fig. 32.

Nos. 3 and 4 show the probable action of a flat flame if the air was admitted in the manner indicated. The same comments that apply to 1 would govern Nos. 5 and 8 excepting that No. 8 is trimmed broad enough but has too many draft spaces. In 6 the draft spacing is too far from the burner and the carbon would be deposited between the burner and draft holes. No. 7 illustrates that longitudinal draft holes are not as good as cross-wise. No. 9 indicates the correctly trimmed burner with correctly placed draft holes. Most engineers make the mistake shown in No. 2, namely having the flame too narrow and admitting air round the shoulders where it cannot get through the flame. Such a fire shows an excess of air no matter how the ashpit doors are regulated, even when the fire is smoking.

Fig. 25 shows a burner to which any desired tip can be attached. Figs. 26 and 27 show well known types of flat tip burners which are widely used. Fig. 28 illustrates a low pressure round flame burner of the same type as Fig. 11 with a regulating valve.

Fig. 29 shows a popular type of regulating valve used for such a burner having in the first place a removable strainer, in the second place a part for regulation set lower down for actual closure. The patent for this valve is owned locally by the manufacturers.

Fig. 30 is an inside mix, with cleaning wire, intended for very heavy fires. Fig. 31 is a flat flame, inside mix, low pressure burner, patented by a local engineer. The tip is removable and easily changed, in case of incorrect slotting. This burner is also made for outside mix. It is one of the best burners in use, especially for low pressure air. Fig. 32 is a successful example of the conical type with adjustable flame and oil regulating valve. This burner is said to be cleanly in operation and well adapted to work in conjunction with automatic furnace regulators.

Oil burners are frequently made of the self-regulating or automatic type in which any variation of the steam pressure regulates the oil accordingly and such burners are said to be quite successful. In each case there are two methods of control, one involving the

entire cutting out of one or more boilers when the load is low and vice versa when the load is high. The other method consists of what is known as central control, whereby the oil pressure in controlled from one point for all fires. This control may be either by hand or automatic and there are patented systems covering each method.

Considerable automatic apparatus is necessary in oil firing. If siphon burners are not used a pump must be furnished, usually of the simple duplex type. It has often been necessary to equip it with an automatic governor for maintaining constant oil pressure. The heater is made in many forms, either the casting throughout or a coil of iron pipe with return ells, or a piece of copper pipe especially coiled for the heater.

The specific heat of petroleum varies from .4 to .5 and according to various authorities 20 to 40 lb. of petroleum per hour can be heated 1 degree F. for each degree of difference between the temperature of the steam and the average temperature of the oil per square foot of heating surface.

Two systems of oil piping are in general use, one in which the oil is pumped directly to the burner and into the fire, the other in which the oil is pumped constantly through a circuit of pipe and returned to the pump suction, the burners being inserted anywhere in this circuit; the heater being cut into the circuit next to the pump on the discharge. The discharge from such a circulating system should never lead into the fuel tank but to the pump suction only, because it is possible for the main body of oil to gradually become so heated that there will be dangerous evolution of explosive gases, especially with crude or unstandardized oils carrying light fractions.

(To be continued)

An electric copper smelter is in successful operation at Delamar, California.

The Board of Public Utilities at Los Angeles has power to investigate public service commissions and establish rates subject to the approval of the Council. By the recently adopted amendments to the charter the city may operate quarries, railroads, elevators, tunnels or viaducts and may supply citizens with any means of heat, illuminating power or refrigeration, selling the surplus to other municipalities.

The Bell report for 1910 shows that the American Telephone & Telegraph Co. has nearly six million stations and twelve million miles of wire in use, and gave a total of over seven billion connections for the year. The gross earnings for the year were $165,600,000, an increase of nearly $16,000,000 over those of 1909. Of this, operation consumed $54,000,000, taxes $8,000,000, current maintenance $25,700,000, and provision for depreciation $26,200,000. The surplus available for charges, etc., was $51,000,000, of which $11,500,000 was paid in interest and $25,000,000 in dividends to the public. The total capitalization is $1,114,310,979, of which $502,306,910 is owned and is in the treasuries of the Bell system and $612,000,000 in the hands of the public.

DISCUSSION ON CONSERVATION.

Conservation was the subject under discussion at a meeting of the Commonwealth Club of San Francisco on March 27, the principal speakers being Frank Short and Theodore Roosevelt.

Mr. Short's Speech.

"Upon this occasion, with ten minutes at my disposal for the purpose of the supposed discussion of a very serious question of constitutional law and civic policy, I feel, in the first place, as though I were a part of the debris that is always assumed necessary to be removed before the real thing is reached upon an occasion of this kind. In referring to the illustrious guest of the evening even indirectly as the 'real thing,' I am not guilty of any originality but am purloining the picturesque language of Governor Stubbs of Kansas.

"I am not, therefore, assuming the position of attempting to speak in contravention of the supposed views of the guest of the evening, but as a country lawyer, as a humble citizen am merely accepting an invitation to indulge in that honored and remaining right of every American citizen, no matter how obscure, to express his views upon any public question. Obviously, I can no more than attempt to hit a few of the very high places in connection with this much discussed and vitally important question. The real question is whether or not as a matter of law and of right and of policy the conservation, disposition, regulation and control of the remaining resources of the country should be undertaken and carried on by the National Government or by the respective States within which such resources are situated. It has been assumed and most earnestly urged, and in many instances with great sincerity I think, that this function of conservation carrying with it upon the part of the National Government large and additional duties and powers of regulation and government in connection with the resources of the several States and the people of such States can be carried out efficiently and to advantage only by the National Government. And it being assumed that the National Government can most advantageously and efficiently carry out these functions it is assumed rather than attempted to be established that it has the legal power and authority so to do. What I now hold to be true for all time, and you will agree with me some day, is that that branch of the Government that under our constitutional system is designated as the one having authority is the only branch of the Government that can conserve the resources or advance and protect the rights of the people or do real and permanent justice in any way. It has been asserted and reiterated, and the assertion certainly sounds good, that 'the remaining resources of the Nation belong to all of the people of the Nation' and are to be held, operated and used for their benefit.

"Assuming the best of faith in this assumption, I would not recommend any one to become really excited about it.

"If, however, we could indulge in the assumption that sufficient income and revenue can and will be derived from the remaining resources of the Nation that after paying for official control, regulation and manage-

ment, and leave a substantial balance for the benefit of the treasury of the Nation and of sufficient extent to reduce the burdens of taxation of one hundred millions of people, allow me to suggest, and ask your candid consideration of the same, that if sufficient income could be realized to meet such expense and leave a balance sufficiently great to reduce the burdens of taxation for the benefit of one hundred millions of people that the ten millions of people from whose industries and resources this income must be obtained would become a trifle stoop-shouldered packing the load.

"As to the observation that 'the remaining resources of the Nation belong to all of the people of the Nation,' the same is subject to two objections. First, the same never was true as a matter of fact or of law, and if the remaining resources of the Nation belong to all of the people of the Nation, there was a time when no one can deny that all of the resources of the Nation belonged to all of the people of the Nation. It was held and decided by the Supreme Court of the United States some seventy-five or eighty years ago that the public lands and the resources connected therewith were held by the Federal Government in trust for the several States and for the inhabitants thereof, to be passed to private ownership and at nominal prices as rapidly as could reasonably be done, to the end that the United States Government might retire from each of the States as a land owner therein as soon as was reasonably possible. These decisions have been reaffirmed, and the relation of the Federal Government to the several States and the public lands therein has been held to be identical, and continues, in accordance with the original decisions, to apply to the later-admitted States and the lands and resources therein.

"It has been repeatedly held that the Federal Government can exercise no governmental powers upon or in connection with the public lands, but that its powers and functions of government were identically the same in each and every one of the States, 'no greater and no less.' That the people of the several States and the localities within which these resources are situated are always better advised as to the value of these resources and better able to provide for their protection, continuation and utilization than any other people, can no more be doubted than the undeniable fact, that they, the people residing in the vicinity, will suffer in a much greater degree than any others by the waste and destruction of these resources. However, I have observed that, having been for a long time engaged in the practice of the law, I speak too much from a lawyer's point of view, and that the majority of the people, whether they should or not, do not enjoy or encourage discussion of questions from a legal point of view. But fortunately we Americans can understand the equities and the moral right and justice of a question.

"The situation can be correctly illustrated by the following statement: Uncle Sam may be assumed to be the father of four sons, and, for the purpose of keeping our history and geography straight, we will name them East, North, South and West. Uncle Sam, being liberal to a fault and mindful of a trust, transferred to his three eldest sons—East, North and South—all of their share in his estate. That all of Uncle Sam's estate pertaining to East, North and South was transferred either to the States or to the people of those States nobody can deny. More especially after their industrious younger brother began to show the real value of his, the left-over, portion of their father's estate, East, North and South began to look with covetous eyes upon the younger brother's inheritance. Finally deep sense of justice and great moral uplift began to pervade the minds of East, North and South (other families have been affected that way), and finally they appeared before Uncle Samuel and said: 'Father, you have been very profligate in the management of your great estate. You have turned over to us and to our children without needful or any restriction the whole of the portion of your estate we can rightfully claim. In the doing of this you have shown great incompetence and have been guilty, we regret to say, of many inequalities, and even frauds, and behold you have sinned against Heaven and in the sight of all men. We can see no way of atoning for this awful offense except that you shall seize, take and hold that portion of the estate that should descend to our younger brother for the benefit of all of your children. And as a further atonement, having shown in the distribution of the family estate to us that you are incompetent and, sad to relate, dishonest, in consideration thereof we will nominate and appoint you the landlord and guardian, without bonds and forever, of all that portion of the family estate that except for this atonement would have belonged to our younger brother, requiring you, however, to see to it with scrupulous care that your elder sons shall receive from the rents, leases and profits of his estate our equal share of the annual income of our beloved younger brother's estate.' Painful as it may seem, these elder brothers seem well nigh unanimous as to this scheme of atonement, and Uncle Sam seems weak and subject to the influences of the majority. History will record, however, that the Constitution broke the will and the elder brothers were charged with the costs and counsel fees.

"Except as all of the people and all of the resources of the country shall be equally taxed for the maintenance of the National Government, the soil and the beneficial resources of each State of the Union are equally dedicated to the use and enjoyment of its people, to its powers and rights of taxation and revenue for the purpose of maintaining State and local government, schools, universities, roads, highways and all of the accompanying necessities of enlightened and progressive people. I am inclined to think with all possible respect that the condition is not one of great difficulty. All that pertains to the common defense and general welfare in an actual sense is for federal control and regulation. All that pertains to the right of local self-government and the local rights, industries and necessities of the people belongs to the several States. If we shall proceed with the design and spirit to recognize these fundamental conditions, neither to retard, but each to accelerate the other, I imagine we shall have little difficulty, but if each is jealous of the other and if each shall reach for more power and try to encroach upon the powers of the other, we shall have no end of discord, but if all of us could accept

the wise counsel of that great American whose capabilities of stating things in true and simple words have made him immortal, we could accept the advice of Abraham Lincoln and avoid all trouble and conflicts by each struggling toward the light and striving to do the right as God gives us to see the light and the right."

Mr. Roosevelt's Speech.

"Mr. Chairman—I want to make one or two notes on the brilliant speech of Judge Short. And at the outset, Judge, when we note the wisdom of the fathers as binding upon conditions which the fathers could by no possibility have foreseen, I want to recall the statement of that wise and witty philosopher, Mr. Dooley, when Thomas Jefferson was quoted on some policy essential to our well-being: 'Thomas Jefferson was a great man, but he lived before the days of open plumbing.' In speaking of the proper attitude which we ought to take in reference to a conservation of our forests and other natural resources, and irrigation, and to the use of electricity in connection with water-power, you spoke of a decision of the Supreme Court rendered eighty years ago, at a time before any human being knew that electricity could be used in connection with water-power or that irrigation was thought of or could have been applied to a single acre under cultivation in the United States, at a time before it had entered the head of any American or almost any man in the civilized world that it was necessary to conserve the forests of the country.

"No man, no member of the bar, or Judge, can have a more profound respect than I have for a decision of the Supreme Court. (Applause.) I respect it as Lincoln respected it—as Lincoln whom you quoted respected it. I do not, however, include in the functions which I attribute to the members of that august tribunal the function of prophecy. If we treated the Constitution as a strait-jacket instead of what the great Chief Justice Marshall declared it to be, an instrument to aid in our growth, we utterly misunderstand the function of the instrument. It would be impossible for this country to grow if it declined to go into any policy rendered necessary by the creation of conditions not merely new but conditions which could not possibly have been foreseen when the Supreme Court decided on some totally different question. The dictum that you quoted, if it was rendered eighty years ago, was rendered even before the homestead act was passed. It was rendered at a time when men like Webster, men like Choate and Everett, still believed that the wise course for the Nation to follow was to sell all its public land in great masses to the highest bidder, take the proceeds and turn everything over to the States in which the public lands were situate. It was rendered before our people had grasped the truth that it was to our interests not to treat those lands merely from the standpoint of revenue, but in the interests of all the people. And when I say all the people I do not mean that each man got 50 cents' worth out of it; I mean in the interests of the people, because it is to the interest of all our people that we shall have a free, self-supporting democracy on the largest scale throughout this Union.

"That decision was rendered before our people, grasping the wisdom of the proper policy to pursue, had decreed that the land should be sold to actual settlers in 160-acre quarter sections on condition that they should be actual residents on that soil.

"If the Nation had power to sell its lands in small parcels on condition that those who bought it should actually reside thereon and till the land, then the Nation has power to sell the land on the condition that the waters running over that land shall be so used that the use shall be in the interest of the whole people and not in the interest of any small monopoly composed of a few people only.

"If the Nation had the right to pass the homestead law and to protect the actual settler against the land speculator, the land monopolist, then the Nation has the right to dispose of the remaining lands in such fashion as to guarantee our people in the future against seeing the most valuable power lying in any portion of these lands from becoming the property in perpetuity of some monopoly. (Applause).

"I listened with very great interest to the parable of Uncle Sam and his four sons, and how brothers East, North and South united to do wrong to the poor West. I was the instrument of that wrongdoing in the case of the reclamation service, and as you listen to the poetry of it I will tell you the facts.

"We passed the reclamation service providing that the waters of the West should be used not for a few speculators, but for the men of the West. We passed that law providing that the Nation should make the initial expenditures—Uncle Sam, out of the portions of the four brothers by the three who were robbers—and then should be reimbursed as far as possible by the proceeds of sale to the men who benefited from it. Not one dollar comes to the Easterner, the Northerner or the Southerner; every dollar is spent in the West, every dollar is spent to build up the small man of the West and to prevent the big man, East or West, coming in and monopolizing the water and the land.

"The appeal is made that in the name of State's rights, the National Government shall not do the duty it is bidden to do under the Constitution. I believe in the fact and not the word; I care for the fact and not for the word. I am for the people's rights. Where the people's rights mean the rights of the Nation, I am for the rights of the Nation; where the people's rights mean State's rights, I am for the State's rights.

"I do not agree in all points with Arizona's Constitution, but I am against the Eastern men who seek to keep Arizona out of Statehood, because I believe that Arizona has the absolute right, so long as her Constitution is in accord with the Constitution of the United State, to make that Constitution in any way she chooses. And I am championing the admission of Arizona against the majority of the Senators, and I suppose the members from the East. On that point the East is wrong, and I am with Arizona against the East.

"We are asked in the interests of State's rights to have the National Government surrender its control over the lands. Surrender it to whom? To the people of the States? Not at all. Surrender the Alaska

lands to whom? To those magnificent Alaskans, the Guggenheim syndicate of Colorado and the Morgan syndicate of New York? (Laughter and applause). And in the name of State's rights, of local self-government, I am asked to agree to turn over the greatest asset that Arizona has to capitalists in Denver and in New York.

"I will give you another instance and I could multiply them indefinitely. Out in Denver last year I struck this same question as to whether the United States had any moral or legal right to interfere with the use of great private corporations, the acquirement in perpetuity by great private corporations of the right to use the power generated by streams flowing across the national domain. And I heard precisely the argument, Judge, that I have heard tonight, the argument that we must not interfere with the local self-government of Colorado; that we must leave Colorado citizens alone. But who do you think the Colorado citizens were? One man was from Ohio and two from New York.

"Great organized capital nowadays never has a merely State function. Organized capital goes into all the different States. Where the State can deal with it best I want the State to do it; where in the interests of the people of the State the Nation can deal with it best I want the Nation to do it. And where, as in California, I believe that the situation can be satisfactorily dealt with only by the heartiest and fullest co-operation between Nation and State I wish to see that co-operation secured and I wish to see them act in unison.

"But I have not yet quite finished with the three bad brothers. I have expected to enjoy this dinner, but not so much as I am enjoying it (laughter). As I understand the chief point of iniquity in the act of the aforesaid brothers was that in their entire corporate capacity they had asked Uncle Sam to help preserve his heritage for the fourth brother—not for the other three, but for the poor fourth brother.

"In the irrigation service we were making a totally new departure. I was trying to get that scheme of irrigation service put through. No Western Congressman or Senator dreamed for a moment that it would be possible to get it put through on the idea of making the National Government pay for it all.

"No State government was taking any effective steps because it could not take any effective steps to develop the irrigable land. Just as with the forests. New Hampshire wants its forests preserved, but the State has never preserved them. The Nation can step in and do it because the Nation can act not only for New Hampshire, but for the States in the watershed of the rivers in New Hampshire. The Mississippi basin drains half the States of this country.

"Not only does the National Government have to step in as between the States, but during my administration it twice had to step in and deal with foreign powers, once with Canada in connection with the St. Mary's and Milk River irrigation projects and once with Mexico in connection with the irrigation projects of the Rio Grande in New Mexico.

"Here in California that is only true of the southern part of the State, the part affected by the Colorado River. Most of your rivers are intrastate rivers.

"And let me point out this fact, that I have never heard the most rigid defender of State rights insist that the Federal Government should not improve the Sacramento because it was an intrastate stream.

"You spoke of the question of the control by the Federal Government of the electrical power in the waters running over the national domain. As regards that I can do nothing more than to refer you to the legal argument advanced by Judge Lindley, an argument which I regard as absolutely unanswerable, and to the legal and ethical argument advanced by Mr. Wheeler. And it seems to me, Judge Short, that I have already answered that question when I quoted to you the provisions of the homestead law. If we had a right to dispose of the land—not absolute but on condition that certain requisites are complied with, doing that in the interest of the democracy as a whole, we have a right to dispose of the land with a proviso as to the use of the water running over it, designed to secure that use for the people as a whole and to prevent it from ever being absorbed by a small monopoly.

"I regard as the vital principle the principle of not parting with the property; the principle of keeping it in the public hands so that at the end of the next forty or fifty years of national development the people shall have it in their possession and shall not find that they have developed a small number of wealthy men who own something that the public can no longer get except by revolution.

"Now I have struck the crux of my appeal. I wish to save the very wealthy men of this country and their advocates and upholders from the ruin that they would bring upon themselves if they were permitted to have their way. It is because I am against revolution; it is because I am against the doctrines of the extremists, of the Socialists; it is because I wish to see this country of ours continued as a genuine democracy; it is because I distrust violence and disbelieve in it; it is because I wish to secure this country against ever seeing a time when the 'have-nots' shall rise against the 'haves'; it is because I wish to secure for our children and our grandchildren and for their children's children the same freedom of opportunity, the same peace and order and justice that we have had in the past."

Manufacture of gasoline from natural gas has been so successful on a small scale that eight large gas compressors have been ordered by an oil company in the Midway district near Bakersfield, California.

A wireless pipe locator has been devised to show the exact situation of underground iron pipes, without unnecessary digging. The apparatus, consisting of a special head telephone receiver and detector coil, is said to pick up the electric waves produced by passing an electric current through the pipe and thus show its position.

JOURNAL OF ELECTRICITY
POWER AND GAS

PUBLISHED WEEKLY BY THE
Technical Publishing Company
E. B. STRONG, President
A. H. HALLORAN, Vice President and Managing Editor
C. L. CORY, Secretary.
DIRECTORS
R. J. DAVIS A. M. HUNT A. H. HALLORAN C. L. CORY E. B. STRONG
604 MISSION STREET, SAN FRANCISCO

EASTERN OFFICE, 140 NASSAU STREET, NEW YORK

TERMS OF SUBSCRIPTION

United States, Cuba and Mexico	per year,	$2.50
Dominion of Canada	"	3.50
Other Foreign Countries within the Postal Union	"	5.00
Single Copies, Current Month	each	.25
Single Copies, prior to Current Month	"	.25

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office *ten days in advance of date of issue.* New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

Entered as second-class matter at the San Francisco Post Office as "The Electrical Journal," July 1895.
Entry changed to "The Journal of Electricity," September, 1895.
Entry changed to "The Journal of Electricity, Power and Gas," August 15, 1899.
Entry changed May 1, 1906, to "The Journal of Electricity, Power and Gas," Weekly.

FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Alameda Electrification

With the date of this issue, it has been given out that the Southern Pacific will inaugurate the electric service on its Alameda local lines. This does not mean that regular service will be started, as it is not expected that the train crews will be sufficiently expert in handling the new equipment for at least two months. Test cars will be run over the lines of the Alameda section, operated by experts, who will give instruction to the regular men.

The thousands of people who daily depend upon the local lines for transportation to and from San Francisco, have waited long and patiently for the innovation, enduring the antiquated steam service, while occasionally there has been bitter complaint at the great length of time consumed in making the change.

People do not appreciate the enormous detail in a change of this sort, where the entire system must be practically rebuilt and re-equipped, together with the solution of the economic question of power supply.

The system might have been completed in less time but at the sacrifice of thoroughness. This all important matter, on which depends not only the safety of human life, but class of service eventually given, has undoubtedly received the consideration it deserves, and we may soon point with pride to the new system with the same gusto that our friends in Los Angeles do to the splendid interurban service centering in that city.

Multiplex Telephony

Much interest has been created by the multiplex system of telephony which Major Squier of the Signal Corps patented and presented to the public. The theory is so interesting and the inventor's action so unselfish as to excite the greatest admiration for this man, who has earned an undying place in the halls of fame. But as to the commercial feasibility of thus superimposing fluctuations of voice frequency on high freqnency wave carriers, there seem to be several practical obstacles. These high frequency carriers, which must necessarily be above the range of audition, are attenuated with extreme rapidity, so that for a given volume of sound at the receiving end much more energy has to be put into the line at the sending end at high frequency than when under normal operation. Furthermore, the difficulties from cross-talk with high frequency are much greater than with a low frequency system. Lastly, even with a big difference in the frequencies employed it is next to impossible, even with efficient tuning circuits, to prevent interference between the outgoing current at one frequency and the receiving circuit at the same end of the line tuned for another frequency. This follows from the fact that on a long line the receiving apparatus, even though sharply tuned, must be very sensitive; also, as a very considerable amount of energy at the sending end would be required to produce com-

mercial volume at the distant end, the outgoing current would produce forced effects in the tuned circuit at the same end of the line. This is the same trouble which has so seriously limited attempts to tune wireless telephone systems so as to send and receive a large number of messages simultaneously within a limited area.

Water Power Locations

A measure which will be of great interest to locators of water rights and have important bearing on the future of hydroelectric development in California, is embraced in Assembly bills Nos. 735 and 788, which are now in the hands of the Governor. These bills limit water appropriations for the use in generating electricity for power and other purposes, to a period of twenty-five years, renewable upon application. While this law will not affect existing water rights, it obstructs the future development of water power and menaces the principles of conservation which the measure is supposed to serve.

Water locations are usually made by men who can spend enough money to build roads, make the preliminary surveys and commence canal construction, but who can seldom finance the building of a modern power plant, necessarily interesting outside capital.

This measure would deter capital from investing in water power projects even more than has the former uncertain tenure of Forest Reserve lands, as it governs all water rights whether located in Forest Reserves or not.

Further than this, the period is of shorter duration than that required to mature bonds which would be considered safe and acceptable.

The tendency of these bills will be then to discourage the development of water power by the people and provide a practical immunity from interference or competition for the existing power companies, and with this immunity will tend to throw undeveloped water appropriations into the hands of these same companies where they desire further extensions for their own uses. This is entirely at variance with the present national policy of conservation.

Promoters' Responsibility

The following paragraph reflecting upon the credit and good name of one of California's greatest and most modern hydroelectric enterprises, which is at once unfair both to the company and the bond house handling the securities, appeared in a New York financial paper last week:

"Since the failure of the negotiations to merge the Great Western Power Company and the Pacific Gas & Electric Company, the 5 per cent bonds of the Great Western Power Company have been dull and inactive around 85. A year or more ago they sold ten points higher. Among bankers it has been known that a certain house which had been a large operator in western railroad and power bonds took over, at the time the indications were very strong that the merger plans would succeed, a block of $1,500,000 of these bonds, anticipating a lively and more attractive market for them because of the improved position due to the many economies the merger would permit to be made. Now that the merger scheme is off, there is some curiosity expressed as to where the house is to find a market for these securities."

During construction the bonds were at par, proving at least public confidence in the project. Even after regular operation was commenced, when the earnings were necessarily small, bond prices were high. They gradually decreased in value until the announcement of the proposed merger, which was in effect a long time lease in which the lessor guaranteed the bond interest. The failure of this deal was sure to have a certain depressing influence not caused by any lack of value in the company's physical security. Even the recent acquisition of the property of the City Electric Company in San Francisco has not sufficed to neutralize this depression.

There can be no question as to the value of the properties which stand behind these bonds; the plant and equipment are thoroughly modern, embracing the best class of engineering and construction, the future possibilities of development on the company's other water rights are large and a better physical security of this nature is seldom found. Yet the bonds are not in popular demand at present. It is evident that the public apathy is due to some deeper cause.

The real reason rests in the manner of promotion and its consequent effect upon the public mind. Promotion stock, tendered as a bonus with bonds purchased at an early date, has been sold, thus making the actual cost of the bond to the purchaser very low. These bonds, in some cases, have been offered below prevailing rates and have effected the market to some extent. But the public's bias is due to statements, invariably overdrawn and misleading, causing them to expect results far beyond the scope of the project and which have eventually caused a popular doubt as to the sincerity of the promoters and real value of the property. Furthermore, this idea has been driven home by the continued depression following the wholesale dumping of promoters' stock on a market too weak to quickly absorb it.

The careful investor scrutinizes the moral risk of a proposition even more thoroughly than its physical value. The manner in which their money is to be handled is more vital than the mere chattel it may buy. Several bonding houses, through years of fair and honest dealings, have established a public confidence which ranks their stamp of approval with that of the Federal government. They do not indorse the visionary prospectus of a promoter. Paper profits are theoretical and must be made real before dividends can be declared. This is the work of an able management, made up of conservative and well-balanced engineers and business men, known to the world in a broader sense than through cunning schemes of promotion or petty politics. Time is here the essence of the matter.

PERSONALS.

A. M. Hunt has returned to his San Francisco office after making a Northern California trip.

D. S. Kramer, sales engineer with the Century Electric Company of St. Louis, Mo., is at San Francisco.

C. L. Cory, has returned to his office at San Francisco after a trip to Los Angeles on electrical engineering business.

Leon Bly, secretary of the Tehama Light & Power Company, of Red Bluff, was a San Francisco visitor during the past week.

M. F. Skeel, salesman for the Benjamin Electric Mfg. Co., is making a trip through Oregon, Washington and British Columbia.

S. Wyman Rolph is now connected with the sales department of the Aylsworth Agencies, at 143 Second street, San Francisco.

Wynn Meredith, manager of Sanderson & Porter's Pacific Coast branch office, visited Eureka last week, accompanied by H. W. Crozier.

Frank H. Short, of Fresno, who is interested in electric power enterprises in Southern California, spent a few days at San Francisco during the past week.

J. W. White, of the San Francisco branch of the Fort Wayne Electric Works, has returned to San Francisco after a trip through the interior of California.

Geo. L. Hoxie of New York has been retained by the Board of Public Utilities of Los Angeles to act on a board of engineers to advise on rates for electric light and power.

Carl D. Heise, of the sales department of the Westinghouse Electric & Manufacturing Company's San Francisco office, recently returned from a vacation trip to Honolulu, accompanied by Mrs. Heise.

F. H. Poss, manager of the Pacific Coast Department of the Holophane Company, also Pacific Coast Sales Agent of the Benjamin Electric Mfg. Co., is on a short trip through the southern part of California.

F. W. Hild, formerly chief engineer and assistant general manager of the Havana Electric Railway Company, has been appointed general manager of the Portland Railway, Light & Power Company at Portland, Ore.

H. H. Noble, president of the Noble Electric Steel Company, returned last Monday from Heroult, where he spent several days in connection with the blowing in of the electric furnace at the company's iron smelting plant.

F. E. Cronise, manager of the new business department of the Pacific Gas & Electric Company, has returned to his San Francisco office after spending a month in eastern cities acquiring information for the benefit of the service.

H. B. Therber, of the engineering staff of Sanderson & Porter, who has been in Arizona and New Mexico for some time, arrived last Tuesday at San Francisco, where he will spend a week, before returning to the New York office.

A. S. Kalenborn has resigned from the engineering staff of Stone & Webster at Reno, Nevada, and will start a motor-renting business at San Francisco in conjunction with A. J. Paul, formerly with the City Electric Company of San Francisco.

S. T. Wellman, of the Wellman-Seaver-Morgan Company, manufacturing engineers of Cleveland, who is acting as consulting engineer for the Noble Electric Steel Company, went to Heroult last week. He was present at the successful resumption of iron ore smelting at the plant, and will remain there for some time in connection with the installation of three improved electric furnaces.

C. H. Weldon of San Francisco has been promoted to the position of division auditior of the Pacific Telephone & Telegraph Company's Northern Division, with headquarters at Portland, Ore. He will have charge of revenue and general accounts.

TRADE NOTES.

The General Electric Company has sold to the San Jose Railroads, of San Jose, Cal., 12 two-motor car equipments, with G. E. 216 motors, and the K 36 controllers for same.

The San Joaquin Light & Power Corporation has purchased from the General Electric Company a Curtis turbine exciter set rated as follows: C. C-4-75-kw.-3300 r.p.m.- 125/125 v.-direct current.

Otis & Squires, 155 New Montgomery street, San Francisco, have been appointed agents for the American Transformer Company of Newark, N. J., and will carry a complete Pacific Coast stock.

The Caldwell Machinery Company of Seattle has succeeded to the business carried on for the past sixteen years under the firm name of the Caldwell Brothers Co. The officers of the new company are: George H. Tinker, president and general manager; Robert C. Polk, secretary; Alexander Hamilton, treasurer. In addition to the foregoing Louis Walter and George F. Kuentzel form the directorate.

J. W. Swaren has opened offices as a consultant on technical advertising in the Shawmut Building, San Francisco. Mr. Swaren was formerly complaint engineer with the General Electric Company at Chicago, later taking charge of the experimental laboratory of the Pacific Gas & Electric Company at San Francisco for three years and a half. He has made a special study of developing new business methods for central stations and has been advertising manager for a number of San Francisco machinery manufacturers.

REANIMATION OF SAN FRANCISCO JOVIANS.

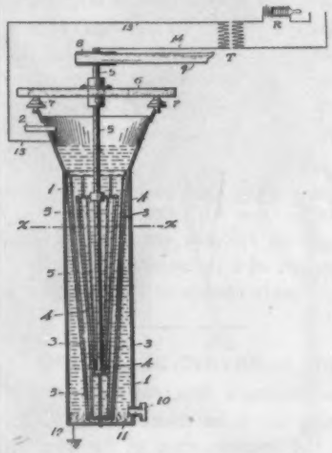
Soon after the Ides of March an energetic bunch of live wires at San Francisco formed a cable (a Jovian cabal) of sufficient carrying capacity to electrify and revivify those Rejuvenated Sons of Jove who are not dead, but sleeping. Mythology tells us that immortality was granted to but few descendants of the almighty Jupiter and that all others must be rejuvenated. Those of San Francisco are also to be regenerated by a dy-no-mo(re) machine which will give eternal life to the local organization.

The I. W. W. (Industrious Willing Workers), otherwise known as the welfare committee, consisting of Statesman W. W. Briggs (ex-officio), C. C. Hillis (National Vulcan), H. E. Sanderson, F. B. Gleason, F. H. Poss, S. H. Taylor, S. B. Gregory are to recommend the formation of a local Jovian Club to foster the true spirit of Jovianism. Nominal quarterly dues are to be put into effect. Jupiter A. E. Drendell guarantees a drill team that will deliver the ritual letter-perfect in an impressive manner and every preparation is being made to pull off a record-breaking rejuvenation in the near future. Other plans include an electrical picnic and a dinner-dance, both of which functions the Jovian wives can attend. Last, but not least, it is planned to start an energetic campaign to bring the national meeting to San Francisco in 1915, when the Panama-Pacific Exposition will set apart a day for Jovianism.

The March 21st meeting of the Portland Section, A. I. E. E. was somewhat of a New Business Session, A. C. McMicken presenting a paper on "Methods of Obtaining Business for the Central Station," and A. S. Moody speaking on "Methods of Selling Electric Appliances." Supplemental talks were given by C. L. Wernicke and L. Quimby.

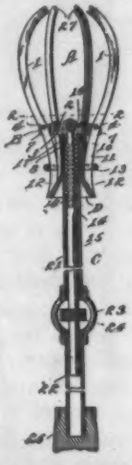
PATENTS

987,117. Separating and Collecting Particles of One Liquid Suspended in Another Liquid. Frederick Gardner Cottrell and Allen Cheever Wright, Berkeley, California, assignors, by mesne assignments, to Petroleum Rectifying Company, San Francisco, Cal. The improvement in the art of separating and collecting particles of one liquid suspended in another liquid which latter is essentially a non-conductor of electricity, consisting in passing the material



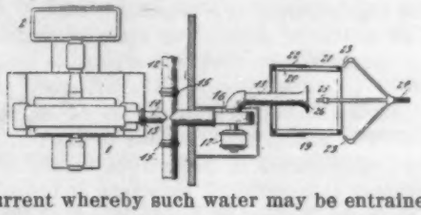
to be treated through the field of electrodes connected to a source of electricity of sufficient voltage to produce coalescence of the suspended particles in such wise as to cause the separation of the two liquids throughout the body of the mixture; and rotating at least one of the electrodes whereby said mixture during and throughout its course through the electric field is agitated with the effect of preventing the coalescing globules from forming complete chains short circuiting the electrodes.

987,562. Electric-Lamp Changer. Mark Ferguson, Pasadena, Cal. A device of the class described comprising a head, a tubular handle rod connected therewith and provided with longitudinal slots, a wedge movable on the rod and having a portion extending through the slot and disposed within the



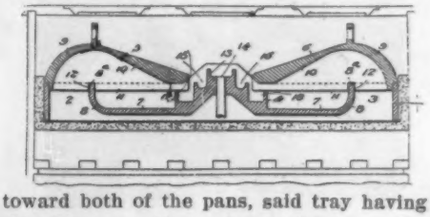
handle rod, a screw rotatably mounted in the handle rod and engaged with the wedge for shifting the same, a connection between the head and screw for preventing the screw from moving longitudinally, jaws mounted on the head and having portions engaged with the wedge, and yielding means co-acting with the wedge to move the jaws.

987,536. Method of and Apparatus for Cooling Electrical Generators and Motors. Frank George Baum, San Francisco, Cal. A method of cooling electric generators which consists in directing a current of air in a predetermined direction, saturating such current of air with moisture, injecting a predetermined amount of water in the form of particles into



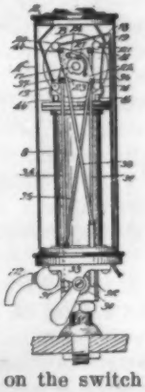
said air current whereby such water may be entrained therein, supplying said air under pressure to a conduit disposed adjacent to and heated by the parts to be cooled, completely evaporating the said entrained particles of water before said particles emerge from said conduit by the heat of the parts to be cooled and thereafter conducting the air so freed from entrained moisture past the said parts.

987,617. Black-Oil Burner. James Warren Elder, Visalia, Cal. In a duplex oil burner, the combination of a tray, vaporizing pans carried thereby, an oil-distributer composed of troughs disposed in stepped arrangement adapted to direct



the flow toward both of the pans, said tray having air inlets, and movable deflectors disposed over the respective air inlets and over the respective pans which direct all of the air from the inlets to the pans and distributer and prevent it from taking any other course.

987,493. Electric Water-Heater. Herbert N. Roche and William Ruth Ray, San Francisco, Cal., assignors to Thomas B. Gray, San Francisco, Cal. The combination in an electric water heater, of a rotary electric switch and its stem, a water controlling valve, and means connecting said valve and said switch, said means including a pair of oppositely oscillating



plates loosely mounted on the switch stem, pawls carried by the plates and engageable with the ratchets fast on the stem when the plates move the pawls in the same direction, and pairs of links connecting the plates and the valve, whereby the switch may be actuated, one pair of said links effective to push on opposite ends of the plates and the other pair effective to pull on opposite ends of the links simultaneously.

INDUSTRIAL

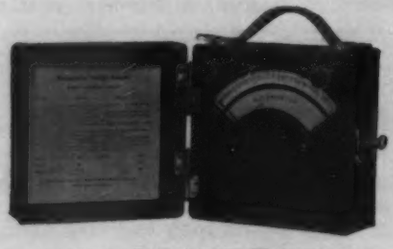
DIRECT CURRENT PORTABLE METERS.

For commercial testing of direct-current apparatus under all conditions, the Westinghouse Electric & Manufacturing Company, of Pittsburg, have recently placed on the market a new line of portable meters and shunts, known as the type R. In the design of these meters the aim was to produce an instrument of high accuracy at a reasonable cost.

With all indicating meters two kinds of errors affect the accuracy of readings. The first kind are due to errors in reading caused by traces of friction, parallax, coarseness of dial markings and similar factors; these errors are independent of the load. The second kind are due to inaccuracies of the meter itself, inaccuracies in calibration, errors in standards used and causes that vary the constants of the instruments. The possible error in reading due to errors of the first kind will be a fixed percentage a of the full scale, and due to errors of the second kind a fixed percentage b of the actual reading. The probable accuracy at any point of the scale will then be expressed in the form

$$\text{Percent possible error} = \frac{aC - bc}{c}$$

in which C = full scale, and c = actual reading.



Type R Portable Meters.

The Type R meters are standardized by direct comparison with absolute standards, and therefore have high initial accuracy, while in their construction every endeavor is made to make the accuracy permanent. The factor b in the above formula is guaranteed not to exceed 0.2 per cent. The factor a depends on personal skill in reading. The clearness of the scale divisions and the mirror running the entire length of the scale to prevent parallax make it safe to assume 0.1 per cent for the factor a with type R meters.

The general appearance of the meters is shown in the accompanying illustration. They operate on the D'Arsonval principle, a moving coil and permanent magnet, which insures freedom from residual error. They differ from most meters operating on this principle in having only a single air gap in which the moving coil, pivoted at one side, swings. This construction permits the entire moving element to be removed and replaced without disturbing the magnetic circuit and allows the entire magnetic circuit to be magnetized, "aged" and tested as a unit, insuring permanence of its strength.

The moving coil is of silk covered wire wound on a light metal frame. This frame acts as an effective damper, resulting in inherently dead-beat readings. The control spring is so supported that its weight is supported by the stationary frame and not by the moving element. This makes the moving part lighter and increases the life of the jewel pivot bearings.

The scales of the meters are 6 inches in length, and hand calibrated to correct for any slight inequalities in the magnet faces. Each scale is provided with a mirror running its entire length, to prevent parallax.

Each meter is mounted in a black walnut carrying case with flexible leather handle. The cover is attached with butt hinges, so that it can be quickly removed when in the way and easily replaced. All metal parts, mounted on a black insulating face plate, are finished in bright nickel.

Instruments of this type are furnished as ammeters, voltmeters, millivolt-meters and volt-ameters. The millivolt-meters are intended for use in connection with portable interchangeable shunts for the measurement of large currents or where a single meter is to be used for a large range of measurements. Interchangeable portable shunts are furnished in capacities of 5 to 1000 amperes and for either 50 or 100 millivolts drop at full load. Each shunt is mounted in a polished walnut box, or a combination box is finished to accommodate several shunts.

The shunts included in the Type R ammeters and the portable shunts for use with the millivolt-meters are made of manganin, a special resistor material having negligible temperature coefficient and thermo-electromotive force. The terminals of the portable shunts are generously proportioned.

WESTERN ELECTRIC BLACK ENAMEL WIRE.

Before the Western Electric Company offered its black enameled wire to the open market it gave its product a four year's trial in the manufacture of its own apparatus. Black enameled wire is now used extensively in the magnetic coils of Western Electric telephone apparatus and is being used with great success as well by many other large manufacturers of electrical apparatus.

The demands of the larger manufacturers of electrical apparatus, particularly apparatus of the types in which small magnetic coils are used, for an insulated wire which would enable them to increase the efficiency of their product while decreasing its cost, have led to the development of a black enameled insulation for magnet wire. Efforts in this direction have been rewarded with even greater success than had been hoped for.

Prior to the development of black enameled magnet wire attempts had been made to produce a satisfactory substitute for silk insulation. These were not successful, as the product either did not possess many of the essential features of satisfactory insulation, or it was not such that it could be manufactured commercially. Black enameled wire is now offered to the market by the Western Electric Company and has been tested under the severest conditions. This wire is no longer an experiment or a theory, but a commercial success.

It is claimed for this wire that while the black enameled insulation is only .0002 inches to .0004 inches in thickness, it is so elastic that when the wire is stretched to the breaking point, the enameled insulation does not break until the wire iself gives way. It will withstand the ordinary atmospheric corrosives and the severe atmospheric conditions of shops, factories, tropical climates and the seacoast indefinitely. It is not injured by indefinite exposure to temperatures of 250 degrees Fahrenheit, a temperature which will destroy the tensile strength of cotton or silk in a few hours. It cannot be removed from the wire by the ordinary solvents, and the wire can be handled as easily and successfully as a silk insulated wire.

One of the great advantages possessed by black enameled wire is its small diameter as compared with that of single silk or cotton insulated wire. The winding space (for a specified number of turns) saved by black enameled wire over single silk No. 34 B. & S. wire is 25 per cent.

D.C. MOTOR STARTING PANELS FOR HEAVY SERVICE.

An increasing demand has arisen, especially in the steel and cement industries, for electrical apparatus of rugged construction and liberal proportions, owing to the fact that apparatus as ordinarily designed does not always stand up under the heavy service imposed. There is also a demand for safety attachments for controlling apparatus to prevent unskilled operators from endangering life or apparatus.

Fig. 1. D.C. Motor Starting Panel for Heavy Service (front view).

Fig. 2. D.C. Motor Starting Panel for Heavy Service (back view).

The General Electric Company has recently designed and built a number of d.c. motor control panels which meet the requirements of heavy service and safety in every way. The accompanying cuts illustrate clearly the rugged character of these panels. The equipment consists of a slate panel mounted on 1¼ in. pipe supports and braced to the floor or wall by means of pipe braces. The panel carries 1 double pole carbon break circuit breaker, 1 single pole 4 or 9 throw starting switch, and 1 double pole field switch (optional but not recommended by the General Electric Company). Necessary interlocks, connections and small resistances.

The starting resistances are usually set on the floor and connected to the switch by means of leads. When the equipment is for a small motor, suitable arrangements can be made for mounting the starting resistance on the panel pipe supports. In the design of starting switch used the results of years of experience has been incorporated, and it is difficult to see where any material improvement could be made. It is impossible, with this switch, to operate otherwise than step by step. A pawl on the handle lever engages in teeth on a ratchet wheel rigidly attached to the contact blade. As the handle is operated back and forth with a sort of pump handle motion, the ratchet wheel is turned and thus the blade is moved from one contact to another.

The circuit breaker and starting switch are interlocked in such a manner that the circuit breaker cannot be closed until the starting switch is in the "off" position. Also if, after the circuit breaker is closed and the starting switch is in an intermediate position, the operator removes his hand from the starting switch handle the circuit breaker will immediately open. Where a field switch is supplied it is also interlocked with the circuit breaker so that the latter cannot be closed unless the field switch is closed. The opening of the field switch causes the circuit breaker to trip.

All the parts are strong and will stand considerable rough usage.

NEW CATALOGUES.

The Sprague Electric Company in Bulletin No. 111 gives a partial list of installations of their engine type generators, illustrating a number of noteworthy plants.

The Century Electric Company, in Bulletin No. 15 have issued an attractive catalogue of Century Alternating Current Fan Motors, employing the split phase induction principle.

Circular No. 1190, just issued by the Westinghouse Electric & Manufacturing Company, describes type "E" engine driven alternating current generators from 50 to 1100 k.v.a. for operating on 60 cycle, 240-2400 volt circuits.

Bulletin No. 1042 from the Allis-Chalmers Company describes their generators and A B C engines. This covers the small direct connected units which find service in lighting plants as exciters and in office buildings, etc., for light and power.

The discussion of induction motor design presented in Bulletin 126 recently issued by the Crocker-Wheeler Company of Ampere, N. J., is handsomely illustrated throughout with half-tone engravings which show many interesting applications as well as presenting the details of construction of the machines.

The Westinghouse Electric & Manufacturing Company, Pittsburg, Pa., has recently issued several new catalogue sections including the following: No. 228, Enclosed Fuse Blocks; No. 229, Subway Fuse Boxes; No. 553, Automatic Voltage Regulators; No. 731, Instrument Transformers; and No. 735, type S and SA Distributing Transformers.

Recent additions to the Westinghouse Electric & Manufacturing Company's Perpetual Catalogue No. 3001 include: Section 317, Type D Indicating Meters for Direct Current; Section 319, Types H, HA and HB Edgewise Switchboard Meters for Direct Current, Section 333, Electrostatic Voltmeter for Voltages up to 200,000 volts; and Section 578, Type A Overvoltage Relays for Direct Current Circuits.

NEWS NOTES

INCORPORATIONS.

SAN FRANCISCO, CAL.—The Municipal Light & Power Company has been incorporated by P. S. Scales, J. H. Sandford, Rudolph Spreckels, Frank Harrold and Claus Spreckels, with a capital stock of $1,000,000.

TRANSMISSION.

SUMAS, WASH.—The Western Canada Power Company will establish a $100,000 power plant and substation here, construction work to begin this year.

OLYMPIA, WASH.—J. W. Bullard, architect, of Tacoma, will have charge of the construction of the $35,000 power house and the $65,000 hospital building at the Veterans' Home in this city.

WALLA WALLA, WASH.—A new 1250 k.v.a. generator for the Pacific Power & Light Company is being installed at the Walla Walla river plant. The company has just completed a new substation here

RENO, NEV.—When the new power plant of the Truckee River General Electric Company is completed that plant will be able to develop 4000 h.p. and will be the largest plant owned by the company on the Truckee River. When completed the plant will cost about $500,000.

PROSPECT, ORE.—Contracts to the extent of $890,000 have been let for the construction of the new power plant of the Rogue River Electrical Company at Prospect, on the Rogue River. The machinery contract includes a power wheel and three generators, capable of generating 80,000 horsepower.

SACRAMENTO, CAL.—Hereafter corporations may acquire water-power privileges for but 25 years, if two bills passed by the Senate receive the Governor's signature. When the 25 years have run the corporation using the water, for developing electricity or other power may renew the lease, and the title to the water will always remain in the State.

WHITE SALMON, WASH.—All the property of the Husum Power Company has been purchased by the Pacific Power & Light Company of Portland, and will be operated as part of its system hereafter. The plant consists of a water-power station at Husum on the White Salmon River, about eight miles of transmission line, and distributing systems in Husum, White Salmon and Bingen.

PORTERVILLE, CAL.—C. H. Holley, manager of the Tulare County Power Company, is making contracts with the farmers to supply electricity to them. Mr. Holley states that as soon as the required number of contracts have been signed up to use the surplus power, he is to get the deeds for the rights of way for the line to connect this city with Visalia, Exeter, Lindsay, Strathmore and Tulare.

KENNEWICK, WASH.—The new 66,000 volt line between Kennewick and Walla Walla, a distance of 50 miles, has been put into operation by the Pacific Power & Light Company, thus making a continuous line 210 miles long from Naches, Washington, to Pendleton, Oregon. From Kennewick, workmen are now building a 66,000 volt line northward into Central Washington, and already have about 80 miles of line completed. They will build about 50 miles further, and the new line will connect the Priest Rapids power plant with the other plants of the Pacific Company. A line is being built west from Priest Rapids about 30 miles to North Yakima, thus making two separate lines between Naches and Kennewick.

HUSUM, WASH.—The Northwest Electric Power Company, with headquarters at Portland, has completed two water-power surveys and water-power rights filed, along the White Salmon River. A dam 50 ft. in height is to be erected and water conveyed for power and irrigation purposes for a distance of three miles along the west side of the river, where a power plant will be installed. Charles M. Huff filed the water rights.

PHOENIX, ARIZ.—The Water Users' Association has awarded contracts for all machinery for the south side power house of the South and Consolidated canals east of Mesa, to the following contractors: The S. Morgan Smith Company of York, Penn., for hydraulic turbines at $16,590, which includes 48 turbine wheels and all the governors, pumps and auxiliary that goes with them; General Electric Company, contract for the electric part of the plant which includes two generators and corresponding transformers and switchboard apparatus at $30,000. About four months will be taken to complete and deliver machinery, meantime the building will be made ready and a necessary short piece of connecting canal completed.

QUINCY, CAL.—A power company has been formed to develop the hydroelectric resources of the middle fork of the Feather River. A corporation, to be financed by New York capitalists, is now being formed, it being planned to build a series of power houses with a total capacity of 85,000 h.p. It is also planned to build storage reservoirs and canals. Among the promoters are George H. Tully, M. P. Barnes and H. R. Lind, the latter being a Nevada mining man. Transmission lines will be extended in all directions in the valley, in order to compete with the Great Western Power Company and the Pacific Gas & Electric Company in supplying electricity to the towns in the valley and furnishing power for irrigation pumps and other purposes.

OGDEN, UTAH.—Within the next 60 days, the time required for the preparation and delivery of the $500,000 worth of bonds which have been sold by the Davis & Weber Counties' Canal Company, active construction work will be started on the power plant which is to produce 5454 h.p. The doubling of the capacity of the reservoir on East Canyon Creek, which will require the enlarging of the present dam, will also be completed during the present year, but the work will not be started until the construction of the power house is under way. The power house, which will be built near Riverdale and about eight miles from the head gate of the canal, will cost in the neighborhood of $300,000. The building of this power house is made possible through the issue of the $500,000 worth of bonds, which were sold to Denver capitalists and to the Commercial National Bank of this city.

PORTLAND, ORE.—It was announced by Guy W. Talbot, president of the Pacific Power & Light Company, that a new 66,000 volt line will be built between the company's plants at Hood River and The Dalles, Oregon, a distance of 22 miles. This work is already under way, and estimates are being prepared for an additional 130 miles of line which will extend from The Dalles eastward along the Columbia River to Kennewick, and there connecting with the company's main line between Naches and Pendleton. These lines, in addition to furnishing reserve power, are for the purpose of distributing current to the many irrigating plants along the

Columbia River. Mr. Talbot also announced that just as soon as possible a 3000 kw. plant would be built on Hood River, and the White Salmon River plant at Husum will be greatly enlarged. A submarine cable will be laid to connect the White Salmon plant with the Hood River plant, and the two will be connected to The Dalles by the new line. The company is just finishing installing 1800 h.p. of new water wheels at the White River plant which furnishes The Dalles, and a complete new 1250 k.v.a. generating unit is on order, which is expected in June. The White River plant is connected to The Dalles by 30 miles of 22,500 volt line, and just as soon as the new line is completed to Hood River so the load can be taken care of from that plant, the line between The Dalles and White River will be rebuilt to 66,000 volt capacity.

ILLUMINATION.

LOS ANGELES, CAL.—Eleven miles of gas pipe has arrived from the East and will be installed at Beverly Hills.

WILLOWS, CAL.—Van E. Britton of San Francisco, engineer of the Northern California Power Company, was here last week making the survey for Willows' new gas plant.

LOS ANGELES, CAL.—The City Council has passed an ordinance to order the necessary appliances to be installed and electric current to be furnished for one year for lighting Third street from Main to Hill street.

SPRINGFIELD, ORE.—The Springfield Council has granted to the Oregon Power Company a gas franchise in Springfield. A four-inch main, four miles long, will run from the Eugene gas plant. A reducing plant will be established here.

SUSANVILLE, CAL.—The Lassen Electric Company has made application to the Board of Trustees for a franchise, for a period of 50 years, to erect, construct and maintain poles and wires for the transmitting of electricity for heat, power, and light in the town of Susanville.

SACRAMENTO, CAL.—Assembly Bill No. 466, introduced by Assemblyman Schnitt of San Francisco, was passed by the Senate and goes to the Governor. It amends Section 629 of the Civil Code, which now requires corporations to furnish gas and electricity on demand, so as to include steam and heat, which must be supplied to householders residing not more than 100 feet from the mains on application and payment.

EUGENE, ORE.—The formal beginning of operations at the Eugene municipal electric plant at Walterville, on the McKenzie River, took place last week, and the members of the City Cuncil, and a large number of citizens inspected the plant. The plant has been built at a cost of $300,000 and has been in course of erection for two years or more. It will supply power for the operation of the pumps at the municipal water plant and will furnish light for the streets. Later the Council plans to do a commercial business.

ANAHEIM, CAL.—Mr. C. S. S. Forney of Los Angeles, has filed a petition with the Board of Supervisors asking them to advertise for sale a franchise for gas mains on roads, streets and alleys in large portions of the county. It has been rumored that the Los Angeles Gas & Construction Company expects to build a central plant to supply Orange, Anaheim and Fullerton, also that the Los Angeles Light & Power Company intends to supply Orange County towns from Los Angeles.

BAKERSFIELD, CAL.—A. G. Wishon, general manager of the San Joaquin Light & Power Corporation, following a conference held in this city with W. C. Balch of Los Angeles, vice-president of the corporation, and A. E. Wishon of this city, manager of the southern division, announces plans of the company to add at a cost of $250,000, 6667 horsepower to the present capacity of the new steam generating plant recently completed in this city, which will make the local plant the largest steam generating electric plant in the valley. Orders have already been placed for the boilers and tube generator, which is to be a duplicate of the one now in use. When installed, the new generator will give the plant 11,600 horsepower. The improvements, to cost $250,000, will make the company's investment in the new steam plant $450,000.

PORTLAND, ORE.—Formal announcement is made by President Josselyn, of the Portland Railway, Light & Power Company, that in the next two years the company will expend $4,000,000 in the development of electrical energy plants, so as to place the company by 1914 in a position to furnish electrical power in a large district in Oregon and Washington. With construction work now under way, coupled with the work laid out for 1911 and 1912, the company will be able to produce 100,000 horsepower by water generation. This amount includes the 15,000 horsepower plant at Oregon City, the 25,000 plant at Cazadero, 25,000 horsepower at Estacada, which will be completed in September this year, and 40,000 additional horsepower on the Upper Clackamas. With the project on the Upper Clackamas, which will be finished in 1914, the company will be able to utilize the fall of the water in this one stream at three different locations. With all these plants completed and with the necessary high tension wire built the company will have expended $7,000,000, the construction already completed representing an outlay of $3,000,000.

BAKERSFIELD, CAL.—A. E. Wishon, assistant manager of the San Joaquin Light & Power Corporation announces a reduction in electric and gas rates for Bakersfield to be effective April 1. The new rates will be of greatest advantage to quantity consumers, but all users will be benefited by the new schedule. The present electric rates are on the basis of 20c per kilowatt hour with a discount allowed on the amount of the bill, while the new rates are to be based upon the hours which the installed capacity of electrical equipment is used, and are graduated in this classification from 12c per kilowatt hour down to 4c per kilowatt hour. To the smallest consumer on the line this will mean a reduction of 1c per kilowatt hour over the existing rate, but the reduction to larger consumers will be much more. The rate on commercial motors, which at present is from 8c down to 2c per kw. hour, will be reduced to 6c down to 1½c per kw. hour. The gas rate now effective is as follows: First 5000 cubic feet, $1 per 1000; next 10,000 cubic feet, 75c per 1000; all over 10,000 cubic feet, 50c per 1000. The 50c rate is the new one. A special rate of 50c per 1000 cubic feet is also offered for heating purposes, providing a separate meter is installed to measure gas used solely for this purpose.

TRANSPORTATION.

MODESTO, CAL.—The Tidewater & Southern Railway has succeeded to a large degree in overcoming objections to its proposed route over Ninth street in this city, to the extent of getting the ordinance granting the permit introduced by the Board.

MODESTO, CAL.—The Board of Trustees has passed an ordinance granting to the San Joaquin Valley Electric Railway a 25-year franchise for a single or double track, standard gauge street railroad tracks, to be constructed between the city of Stockton and the city of Modesto.

NAPA, CAL.—Theo. A. Bell, attorney for the Napa & Lakeport Railroad, has asked that the franchise for the road for operating on Union and other streets of this city be extended for one year. He said that W. Rankin is now in the East completing the financing of the new line.

EASTON, CAL.—Ansel Easton has applied to the Burlingame Trustees for a franchise for a street railway in this city.

SEATTLE, WASH.—The Seattle-Electric Railway Company has been granted a permit to erect car barns at 1005 East Madison street, this city.

SACRAMENTO, CAL.—The franchise applied for by the Sacramento Electric, Gas & Railway Company to run a cross-town line from Fifteenth and I streets to the Western Pacific depot at Nineteenth and K, and on to Twenty-first and P streets, has been referred to the judiciary committee, after being vetoed by Mayor Beard for the reason that it lacked proper restrictions and safeguards to the city.

OAKLAND, CAL.—The Oakland Traction Company has been granted a franchise on Hopkins street from Fruitvale avenue to Redwood road. The bid is $1000, the company agreeing to maintain lights along the line. The same company withdrew an application for a franchise in East Sixteenth street, and the Scenic boulevard, filing a new one, which substitutes Ignacio avenue for the boulevard.

SAN FRANCISCO, CAL.—The Northern Electric Company, with offices in the Alaska Commercial Building, has the preliminary plans out for extensive improvements which are to be made to the system of Marysville. The company has acquired valuable property in that city which will be improved by the construction of a modern passenger depot, freight sheds and additional trackage. The work will probably not be undertaken until late in the year.

RED BLUFF, CAL.—An electric railway to connect Willows, Woodland, Colusa, Orland, Corning, Red Bluff and Redding is proposed as a result of a meeting held here last week between Charles L. Donohue, an attorney of Willows; a civil engineer from Los Angeles, and local capitalists. A meeting of capitalists interested will be held at Willows and the company organized. Attorney Donohue submitted estimates of cost at the meeting here Sunday to show that the line can be built and equipped for $2,200,000.

LOS ANGELES, CAL.—Following the consolidation of the Pacific Electric, Los Angeles Pacific and Los Angeles and Redondo electric lines under the ownership and management of the Southern Pacific and as a result of the recent visit to this city of Judge R. S. Lovett, president of the Southern Pacific, there has been sent to him in New York a complete report as to needed improvements for the electric lines. These include the widening of the gauge of the Los Angeles and Redondo and of the narrow-gauge line between Los Angeles and San Pedro and the completion of the equipment of the Sentous line. From Clement Junction cars will be run over an S. P. track to the Arcade station, where passengers and baggage for beach points will be received from S. P. trains, elminating the present necessity of transporting them across the city to the depots of the electric lines.

WATERWORKS.

SILVERTON, ORE.—The Marshon Construction Company of Seattle has been awarded the contract for the construction of the water and sewer system for Silverton, Ore. The bid is $63,940.

OAKLAND, CAL.—The Bay Cities Water Company is serving water in the San Leandro district, having completed that section of its construction work, and is now rushing the construction of the second section of its system, the laying of pipe in the Elmhurst and Fitchburg district. As soon as carloads of pipe, now delayed in transit on account of storms, arrive from the East, the task of building the Alameda system will commence.

WILSON CREEK, WASH.—The Northwestern Improvement Company, a corporation, has petitioned the county commissioners of Grant County, Wash., for a franchise giving them the right to operate water pipes for conducting water in the city.

WENATCHEE, WASH.—Plans are now under consideration by Mayor A. C. Dallach and members of the municipal council to improve and to increase the city's water supply. They contemplate the purchase of a new pump to cost about $5000 and to be installed in the station on the bank of the Columbia River at the foot of Fifth Street North.

BELLINGHAM, WASH.—City Engineer H. A. Whitney has been instructed by the water board to make surveys and prepare estimates on the cost of extending the Larsen pumping system by running an 8-in. main or 6-in. main or the two sizes in alternation, down Electric avenue, Spruce street and the Geneva road from the city intake to a point near Forest Landing.

SAN FRANCISCO, CAL.—The city has closed its option on the Cherry Creek section of the Hetch-Hetchy and Lake Eleanor water system for $600,000. The Supervisors unanimously instructed the public utilities committee to execute a contract of sale. The money to pay Ham Hall and his associates will be taken from the proceeds of the $1,250,000 bond sale on April 20. With the balance City Engineer Manson will begin construction of the dam at Lake Eleanor, doing the work of stripping down to the foundation this season, constructing a wagon road to the site and digging canals to unite the Cherry Creek watershed with Lake Eleanor.

OAKLAND, CAL.—Under a decision of the U. S. Circuit Court of Appeals at Seattle, in what is considered an analogous case, it is the opinion of the city attorney and special attorneys engaged in the water-rate cases, that Oakland will soon be relieved of the burden of its water-rate injunction suits pending for years, and now costing the city fully $40,000 a year to defend. The opinion was presented to the city council and it was announced that in the near future the U. S. Circuit Court would be moved for a dismissal, following the decision in the Seattle case, upon the ground that the United States Courts have no jurisdiction in matters where the State constitution embodies the provision of the United States Constitution, that no one shall be deprived of life, liberty or property without due process of law.

SAN FRANCISCO, CAL.—To bring the city and the Spring Valley Water Company together upon some amicable ground to arrive at some solution of the municipality's water problem during the next five years, Supervisor Murdock has introduced a resolution in the board which sets forth that the city vitally needs more water; that the delays of court procedure made uncertain when the Federal adjudication as to values might be expected; that virtually everybody wanted the city to acquire the Spring Valley plant upon fair terms and that the interests of the city demanded united action. The resolution itself invited the organization referred to to co-operate and the Spring Valley Company to enter into negotiation in a friendly spirit and asked the various city departments to lend their aid in an early general conference. Following are the organizations referred to, each of which is to be requested to authorize its president or a properly accredited delegate "to act in conjunction with the public utilities committee in a determined effort to arrive at a settlement of the matters at issue"; Merchants' Association, Chamber of Commerce, Labor Council, Building Trades Council, Real Estate Association, Press Association, Civic League, Bar Association, California Development Board, Commonwealth Club and board of directors of the Panama-Pacific Exposition.